

Joint Stabilization Through Induced Ligament Sclerosis

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THIS article is presented following a series of 253 cases of sacroiliac relaxation which have been treated during the past 14 years.

It is the author's opinion that the sacroiliac articulation is an important factor in low-back pain and disability, a factor which has been almost eliminated from consideration in the past two decades. It is, furthermore, the author's opinion that the most frequent factor in chronic or recurrent sacroiliac disability is relaxation of the posterior sacroiliac ligament.

A simplified, specific method of diagnosis of this condition will be presented and a method of treatment by ligament sclerosis will be described which has been found to be very successful.

HISTORICAL REVIEW

Mengert¹ in 1943 pointed out that relaxation of the ligaments results in instability of the joint and increased susceptibility to strain and sprain. This had been pointed out with reference to the pelvic ligaments in 1911 by Meisenbach and in 1916 by Magnuson.

In 1927 when Gaenslen described his diagnostic sign for sacroiliac disability he pointed out that it depended upon "impaired ligamentous support." He then went on to describe his arthrodesis which had the advantage "that the posterior sacroiliac ligaments were not weakened or interfered with."

In 1944 Ghormley observed, "As the widespread interest in lesions of the intervertebral discs has drawn increased attention to the lumbosacral joint the importance of the sacroiliac joint as a source of symptoms has waned, perhaps to a point where sacroiliac conditions may be overlooked."

Again in 1951 Ghormley stated that since the syndrome of the intervertebral disc has been recognized perhaps the diagnosis of sacroiliac strain "should not have been abandoned for undoubtedly the sacroiliac joint does cause symptoms at times."

A survey of the literature shows that although the preponderance of sacroiliac disability was recognized to be a result of impaired ligamentous support, the treatment whether by operation or mechanical support has had a tendency to weaken the ligaments.

It would further appear that this is the first successful method of strengthening the ligamentous support of the pelvis. Re-establishment

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of the tension of the ligaments stabilizes the joint and eliminates the pain and susceptibility to recurrence. The stabilization is accomplished through sclerosis of the ligaments and is achieved by the injection of a sclerosing solution within the fibrous bundles of the ligament.

HISTORY OF SCLEROTHERAPY

A review of the history of sclerotherapy (treatment by injection of a sclerosing solution) since its introduction in 1832 has been given by Riddle.² A scientific rationale for sclerotherapy was established in 1881 when Warren reported a study of tissue reaction to the injection of *Quercus alba*. This reaction was characterized by the early formation of "plasto-lymph"; this later became organized into fibrous tissue which acquired strength in 10 to 12 days.

In 1929 Hall and Frasier, using guinea pigs, monkeys, and dogs, demonstrated the vigorous proliferation of endothelial and connective-tissue cells following the injection of a sclerosing solution. These experiments were verified and elaborated by Harris, Manoil, White and Biskind, and others who compared the effects of different solutions. Harris and his associates, using guinea pigs, showed that the main mass of proliferating fibrous tissue was located in the connective-tissue septa.

Rice³ also investigated human tendons and fascia and observed the progressive effect of various solutions on the tissues at periods ranging from 15 hours to 42 days. He observed that the tissue reaction induced by irritants follows the pattern of inflammation. The reaction of connective-tissue cells is one of permanence and contractility. This investigation also revealed that the ideal solution was one which produced a minimum of early exudate and later a maximum of connective tissue. Investigation is being made on the histological effects of sclerosing solution injected into the ligaments of animals. They appear to complement the results previously mentioned and will be reported on completion.

Sclerotherapy is successfully used today in hospitals and university clinics by many competent surgeons in the treatment of varicose veins,

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hemorrhoids, hernias, hydroceles, bursae, ganglions, and angiomata; it is also used within the joint cavity for the treatment of relaxation of the temporomandibular and other small joints.

No mention has been found in the literature of sclerotherapy within the ligaments. However, in 1930, following anatomical studies which revealed the richness of sensory nerve endings in articular ligaments, Leriche advocated the infiltration of these ligaments with procaine for the relief of pain in functional articular disturbances after sprains or fractures.

I wish to emphasize the specific points in the differential diagnosis of sacroiliac relaxation and submit a method of treatment which I have found to be successful in this disability as well as in some other situations where relaxation of the joints exists.

ANATOMY

"The pelvic arch is formed by the sacrum and the two iliac bones . . . the sacrum is not held in place by virtue of its position or form, but is suspended from the iliac bones by a very strong posterior sacroiliac ligament in such a way that they bear all the strain, the bone shape contributing no support whatsoever," according to Eliason. The size of the posterior sacroiliac ligament indicates its importance in supporting the articulation and in preventing any excess movement of the articulation (Figs. 1 and 2).

The center of the sacroiliac joint lies immediately in front of the posterior superior spine of the ilium. The posterior sacroiliac ligament forms the chief bond of connection between the sacrum and the ilium. It fans out posteriorly and medially from the posterior margin of the sacroiliac joint. It is attached medially to the spines and body of the first, second and third segments of the sacrum. The lateral attachment of the ligament is to that portion of the wing of the ilium which extends to the sacroiliac joint.

Francis⁴ recently pointed out that the sacroiliac joint may be classified as a gliding joint rather than a hinge joint. He also presented a more detailed description of the pelvic ligaments. "The interosseous sacroiliac ligament, which may be regarded as the deepest portion of the general posterior ligament, consists of many very strong fibers which pass in various directions between the iliac and sacral tuberosities . . . the interosseous and posterior sacroiliac ligaments prevent forward movement of the sacrum in weight bearing . . ." Since the fibers run in various directions, the ligament lends itself particularly well to stabilization by sclerosis.

ETIOLOGY

Functional relaxation of the posterior sacroiliac ligament occurs during pregnancy. Francis⁴ states that "During pregnancy the corpus luteum

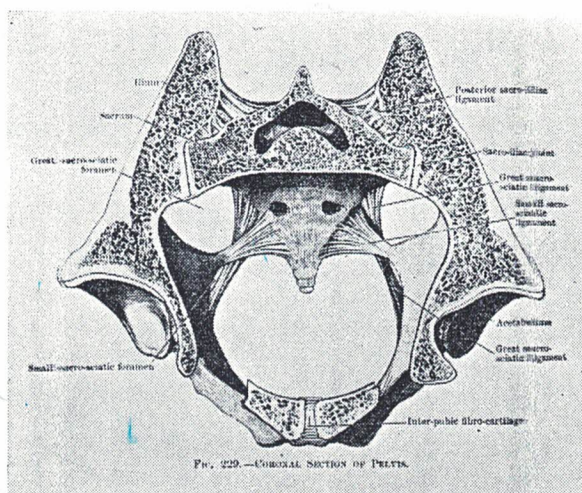


Fig. 1

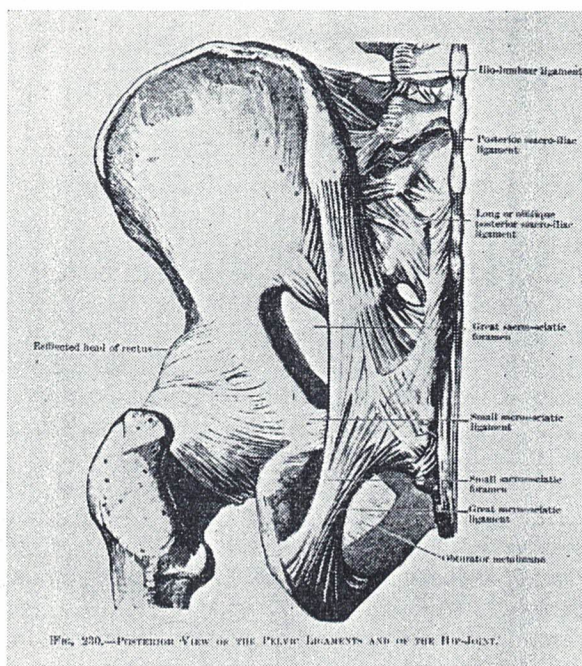


Fig. 2

elaborates a hormone called relaxin. The exact method of its action in human beings has not been determined, but during pregnancy the ligaments relax permitting the sacroiliac joints and the pubic symphysis to become wider and allowing a greater range of movement. After delivery the joints gradually return to practically their original condition. The relaxation of the sacroiliac joints, together with the forward shift of the center of gravity that occurs during pregnancy, account for much of the low backache and for the signs of sacroiliac strain frequently observed in the late months of pregnancy."

Sometimes after parturition the ligaments do not regain their previous tension and the relaxation persists, resulting in chronic low-back pain and susceptibility to strains.

Pathological relaxation of the posterior sacroiliac ligament results from strains, sprains, and

tearing of the fibers, which may occur in two ways (see Cases 4 and 14 below):

1. Through a single, specific trauma incidental to the strain of an unaccustomed task. This may occur in a person of sedentary occupation carrying a heavy object, such as the executive carrying a piano, in Case 3, or in anyone receiving a sudden jerk while lifting or carrying a heavy object. Moreover, an increasing number of cases of sacroiliac relaxation may be seen as the result of the growing number of automobile rear-end collisions. The victim may be in either car, either as the driver or as a passenger. (See Case 16.)

2. As the result of an occupation which requires a great deal of lifting, twisting strain in a stooped position, such as that of a housewife, farmer, an athlete, or an industrial worker. (Note case reports.)

PATHOLOGY

Anderson and Peterson⁵ in 1944, using the Chamberlain roentgenographic technique, verified abnormal movement in the sacroiliac joint which has been mentioned by Snelling in 1870 and demonstrated by Goldthwaite and Osgood in 1905.

"Relaxation of these ligaments favors a forward displacement of the top of the sacrum, although the resultant subluxation is so slight that rarely is it recognizable on the roentgen ray plate," according to Lynch.

It is the author's contention that when abnormal movement develops in a joint, this is due to a relaxation of the ligaments and is frequently accompanied by pain. It is this condition which will here be referred to as "relaxation of the posterior sacroiliac ligament."

DIAGNOSIS

SYMPTOMS

1. The pain accompanying relaxation of the sacroiliac ligament may be continuous or recurrent and is susceptible to acute aggravation. It may be aching in character, or it may be severe and knifelike when movement is attempted and prevent all movement. It is aggravated by bending, twisting, rising and sitting, coughing, sneezing, or prolonged arduous activity. In the severe cases, the pain and inability to turn is so marked that the patient is not only unable to perform any labor, but is often confined to bed. The general activity of the patient is usually curtailed.

Many patients endure the pain for years, learning to live within the restrictions of their back, seeking relief only when it becomes unbearable. This is especially true if it first appears during the discomforts of pregnancy, or when the patient assumes it to be the result of a fracture of the spine, pelvis, or femur, or when its origin is complicated by some other factor.

2. Important is the fact that sacroiliac pain is unilateral and often confined to the buttock. If the pain is referred beyond the buttock, it

usually goes down the outside of the thigh as pointed out by Baer in 1917 and later by J. Travell and W. Travell.⁶ Occasionally it goes below the knee, usually coursing down the lateral aspect of the leg along the peroneal region to within two inches of the tip of the external malleolus. It does not extend to the foot. Rarely if ever is the pain referred down the back of the thigh or to the calf, and the sciatic nerve is never tender on pressure or painful on stretching.

Frequently the irritation of the needle, as described by J. Travell⁶ and W. Travell,⁶ Steindler, and Steinbrocker, and the pressure of the anesthetic within the posterior sacroiliac ligament will immediately reproduce the local pain as well as the referred pain low in the buttock laterally and occasionally down the outside of the thigh and leg; this will last for about two minutes until anesthesia begins. In over 1000 injections performed by the author, the pain never went down the back of the thigh or down the calf or into the foot.

The use of efocaine® will reproduce the referred pain with greater intensity for two minutes because of the immediate local reaction which it produces.

Pain is occasionally referred into the groin but this pain disappears when the sacroiliac relaxation is relieved. The pain in the groin has never been reproduced by the insertion of the needle.

3. One cannot rule out bilateral sacroiliac disability when there is a history of pain in both buttocks. Sometimes the patient will call attention to symptoms referable to the opposite joint after the acute phase has cleared up on the first side. When bilateral sacroiliac relaxation exists, the patient may suffer an acute exacerbation at one time on one side and at another time on the other side. These cases call for careful diagnosis; they do respond to treatment.

4. In very severe cases activity is curtailed and strong analgesics, such as codeine or demerol,® are necessary for relief. Only a small percentage of the patients have to be hospitalized.

EXAMINATION

In the diagnosis of low-back disabilities, these points are important in the following order: (1) The patient should by his own movements produce the "trigger point" of pain and locate it with one finger. (2) The examiner should locate the trigger point with one thumb. This is more readily accomplished while the patient is making strain on the ligament. (3) The examiner should then confirm the trigger point by eliminating it with the injection of a local anesthetic.

1. When standing erect the patient often locates the pain in the sacroiliac area. Frequently bending, twisting, and lifting are necessary to aid in its definite location. It has been the

author's observation that frequently the patient will be able to locate the trigger point in the posterior sacroiliac ligament with one finger when the spine is in extreme hyperextension rather than flexion. The patient's finger is frequently placed lateral to the posterior superior spine because the joint is located beneath and lateral to the spine.

AUTHOR'S TEST

2. The following test has been developed by the author: The patient stands with feet together, knees extended, body bent well forward, and arms hanging free. The examiner stands behind and somewhat to the left of the patient. The examiner's left hand is placed in front of the pelvis and gently grasps the area in the region of either anterior superior spine of the ilium, or he may gently grasp the patient's left shoulder with his left hand. The right thumb is placed in the sacroiliac groove (the depression between the posterior superior spine of the ilium and the sacrum) and gentle but firm pressure is made with the thumb as the patient assumes the erect position. The patient will flinch and tell the examiner "that is the place" if the sacroiliac joint is involved. The examiner should then compare this with the other sacroiliac joint, with the lumbosacral depression, and again with the suspected side. This is the most valuable of all tests, because it is almost always positive when the sacroiliac joint is involved; it is so easy to make that any physician could become adept at performing it.

3. The examiner should be able to determine whether both sacroiliac joints are involved.

The examiner can usually determine whether the superior or the inferior portion of the ligament is more involved by pressing with his thumb above and again below the posterior superior spine of the ilium as the patient assumes the erect position.

4. Have the patient lie in the supine position. Steindler and Luck pointed out that the leg tests cause strain in so many structures; "the identification of the particular structure involved rests with the local point of tenderness." Gaenslen's sign, Lasègue's sign, fabere sign, and the Pitkin maneuver are frequently positive for pain in the sacroiliac area, and when present they confirm the test described above. When pain is produced by any of these tests the patient should place one finger on the trigger point, and the examiner should check the point with his finger in order to determine which pelvic joint is involved.

CONFIRMATION OF DIAGNOSIS

5. To confirm the diagnosis the patient should lie in the prone position, comfortable and relaxed. With a 24-gauge needle 1½ inches long, or a 23-gauge needle 2½ inches long (depending on the size of the patient), five to ten cubic cen-

timeters of a local anesthetic solution is injected mid-way between the midline and the posterior superior spine of the ilium, the needle being inserted through the skin and directed outward at an angle of 45 degrees beneath the ilium. Figure 1 illustrates the accessibility of the posterior sacroiliac ligament for insertion of the needle, both in diagnosis and treatment. The resistance of the ligament will be felt. The anesthetic is injected ahead of the needle fanwise in three directions until the hub of the needle depresses the skin.

The operator's touch should be so delicate and experienced and the insertion of the needle so gentle that he will know when the point of the needle is entering the ligament or impinging on either the ilium or the sacrum before the patient detects it. If necessary the needle should be withdrawn enough to change its direction. After a few minutes the patient arises and is able to go through movements without pain which were not possible before.

Haldeman in 1938 described this method for differential diagnosis.

COMPLICATIONS IN DIAGNOSIS

Frequently, after an accident or during an acute exacerbation, the diagnosis cannot be definitely made for several days or a few weeks until the pain and tenderness have subsided and become localized under treatment by rest, belt support, analgesics, and sedatives. The ice bag will usually give more relief than heat. Diathermy and lamps are of no special benefit.

Relaxation of the ligament frequently results from an accident in which the pelvis, spine, or femur is fractured. In these cases the sacroiliac condition may go unnoticed until after a few months, when the fractures have united and the patient resumes his activities, causing distress in the weakened sacroiliac joint (cases 7, 8, 15, 16). All patients with confining injuries between the chest and the knee should be examined for low-back injury after activity has been resumed and before discharge.

Frequently two or more low-back disabilities co-exist, and it is necessary to recognize them. The presence of each should be fully explained, so that the patient will understand what to expect. Otherwise, the treatment will be unsatisfactory to both the patient and the doctor. This is particularly true when relaxation of the posterior sacroiliac ligament co-exists with either relaxation of the lumbosacral ligaments, disc injury, or arthritis of the lumbar spine accompanied by pain.

ROENTGENOLOGY

Although roentgenograms should always be made, they are usually without value in cases of relaxation of the posterior sacroiliac ligament. Roentgenographic evidence of hypertrophic arthritis does not necessarily signify that the arthritis

is the cause of the low-back pain. Frequently sacroiliac relaxation has been relieved by sclerosis when arthritis of the sacroiliac joint was also present (Case 17).

DIFFERENTIAL DIAGNOSIS

1. Pain and point of tenderness are localized just beneath the posterior superior spine of the ilium.

2. The pain is unilateral and when referred goes laterally into the buttock and down the outside of the thigh, occasionally extending into the lateral side of the leg but never into the foot.

3. The sciatic nerve is never tender or painful on stretching, but pain may occasionally go down the back of the calf.

4. The patellar and Achilles reflexes are not affected.

5. When the patient is standing erect, moderate flexion of the spine frequently is not painful; extreme hyperextension frequently is painful.

6. When present, deviation of the spine is to the uninvolved side.

7. When the patient is standing with the body bent forward, pressure in the sacroiliac groove with the thumb as he straightens up will always produce definite pain, as compared with the opposite sacroiliac and lumbosacral articulations.

8. Gaenslen's sign, Lasegue's sign, fabere sign and the Pitkin maneuver are frequently positive.

9. Injection of a local anesthetic within the ligament will relieve the pain and confirm the diagnosis.

10. Roentgenograms are not of positive value.

11. A man's belt worn tightly beneath the anterior superior spines of the ilium will frequently relieve sacroiliac pain but no other low-back pain.

TREATMENT

Relaxation of the sacroiliac joint is particularly adaptable to stabilization by sclerotherapy since the fibers of the posterior sacroiliac ligament pass in various directions (Figs. 1 and 2) and the proliferation of fibrous tissue which takes place in the connective-tissue septa between the separate bundles and fibers of the ligament will both strengthen the ligament and inhibit the abnormal movement in the joint. Excellent results have been obtained, and in over 1,000 injections no infection, hematoma, sloughing, paralysis, paraesthesia or any other detrimental result has occurred.

TECHNIQUE

The patient lies relaxed on the abdomen. The site selected for injection may be beneath the posterior superior spine of the ilium or within $1\frac{1}{2}$ inches above or below.

A 24-gauge needle $1\frac{1}{2}$ inches long or a 23-gauge needle $2\frac{1}{2}$ inches long attached to a syringe containing three to five cubic centimeters of long-lasting local anesthetic is inserted through the skin at a point one-half inch lateral to the mid-line at

an angle of 45 degrees. The anesthetic is slowly injected ahead of the needle until the needle has been inserted its full length and its hub is depressing the skin.

While the needle remains in place the syringe is replaced by one containing one-half to one cubic centimeter of the sclerosing solution which is then injected into the ligament, not into the muscle or subcutaneous tissue, as the needle is withdrawn. The posterior margin of the sacroiliac articulation is approximately three inches in length, and the posterior sacroiliac ligament fans out to perhaps four inches. The relaxation and pain usually occur in the upper portion of the ligament where the fibers are longer, and more injections are required above the posterior spine than below it. The space between the sacrum and the ilium is narrower below the posterior spine of the ilium and lies closer to the mid-line of the sacrum. Consequently, the needle is started closer to the mid-line and is directed a little less deeply than above. After each injection the patient pursues his usual activities.

FREQUENCY OF TREATMENTS

The treatments are usually given twice a week, but three a week may be given if necessary to shorten the course. Usually the patient is cured by five or seven treatments. In less severe cases two treatments may suffice.

The treatments are discontinued when the patient is assured by his own activities that he has recovered.

As the joint becomes stabilized, the pain disappears promptly, and the patient gradually resumes his former activities. No waiting period is necessary, but unnecessarily strenuous activity is avoided for several weeks.

The patient returns for re-evaluation two weeks after the last treatment and then at longer intervals. Failure of joint stabilization or residual pain indicates additional treatments.

For several years the author did not treat any patient by injection whose symptoms were of less than three months' duration. In recent years he has treated patients with severe symptoms of a few weeks' duration after the acute symptoms had disappeared, if he was convinced that the severity of the ligamentous tear would result in a permanent relaxation. This earlier treatment in severe uncomplicated cases relieves the suffering, permits earlier resumption of activities, and probably prevents a later relaxation of the ligament, since the sclerosing solution is injected during the stage of inflammation.

The relief of pain in acute sacroiliac strain by the injection of anesthetic oil has been described by Kirschbaum.

DRUG THERAPY

Medication during treatment consists of acetylsalicylic acid, 0.6 gram, with or without codeine,

30 to 60 milligrams, or demerol,[®] 50 milligrams. A few patients never need any analgesics. In the others the amount varies greatly. It is advisable to insist on comfort in order that the patient will not dread the treatment or after-effects. In some instances an analgesic is administered one hour before treatment. With the use of long-lasting anesthesia the stronger analgesics are less often necessary.

ADDITIONAL THERAPY

An ice bag rather than heat is advised for pain between treatments, but this also is seldom necessary when long-lasting local anesthesia is used.

The elimination of obesity with its resulting change in posture and strain will frequently ameliorate the symptoms in a variety of low-back disorders, including sacroiliac relaxation. Weight loss will often obviate the necessity of operation in cases of lumbosacral and questionable disc involvement.

Some of the more recently developed local anesthetics have a more prolonged effect. Among these should be mentioned eucupine and quino-caine.[®]

ADDITIONAL CONSIDERATIONS

One should realize that the use of an anesthetic which lasts for a period of days or weeks instead of hours in the treatment of this disability may cause the patients to assume they are cured before they have received enough injections of the sclerosing solution to stabilize the joint. However, the increased comfort of the patient obtained with these anesthetic agents strongly recommends their use.

The sclerosing solution is not given at the time of diagnosis, because the needle has been withdrawn after the injection of the local anesthetic to permit activity of the patient and to observe the effect of the injection. The sclerosing solution is given on the second visit to the office, two or three days later. This assists in gaining the patient's confidence on the first visit.

Subluxations of the sacroiliac joint of variable degree sometimes accompany relaxation of the ligaments. Reduction will sometimes facilitate favorable results from injection (Case 16). A method used successfully by the author in several cases is to have the patient lie on his back on the treatment table after the posterior sacroiliac ligament has been infiltrated with a local anesthetic. The knee and hip on the affected side are flexed to right angles. An assistant presses down on the chest and on the opposite side of the pelvis. The operator grasps the raised ankle for control with one hand, and with his other forearm applies upward traction to the flexed knee. The traction is maintained while the thigh and leg are lowered to the table.

No reduction procedures should be used in

postpartum cases unless these patients have not responded to the injection treatment at the end of a few weeks.

CASE REPORTS

In the following cases the patients were free from symptoms within two weeks or less after the last injection and were able to resume their former activities within a few weeks. Prolonged-action anesthesia was not used in any of the cases reported in this article. The author has found eucupine with procaine solution satisfactory as a local anesthetic. The sclerosing solution in use is synasol.[®]

Case 1, a nurse, aged 32. The symptoms, of 8 months' duration, had developed while she was lifting a heavy patient from floor to bed. Upon her admission to the hospital, two orthopedic surgeons diagnosed a disc injury and advised operation. An injection of novocaine[®] with saline into the caudal canal resulted in no benefit. The patient had eight sclerosing injections in one month, during which she was working. She has remained cured for seven years. When she was last seen, in April 1953, she was engaged in her occupation as a nurse.

Case 2, a farmer, aged 44. His symptoms, of two years' duration, had begun while he was carrying a hog downstairs. He was unable to do light work. After seven injections within one month he was able to run a tractor with a plow attached and to reach all levers. He was last seen in June 1952, and he has been cured for eight years.

Case 3, an executive, aged 51. The symptoms, of twenty years' duration, had begun when he was carrying a piano. The pain was referred down the lateral aspect of the thigh and the leg when he was carrying objects such as a heavy traveling bag. He alternately wore three sacroiliac belts. He had five injections in a period of three weeks, after which he was able to play golf without a sacroiliac belt. He remained cured for eight years and died of a cerebral accident.

Case 4, a housewife, aged 42. Her symptoms, which had lasted 20 years, began during the second of three pregnancies. She had five injections during a period of three weeks. She has remained cured for ten years; since her cure she has worked in a factory and cared for her house. She was last seen in November, 1952.

Case 5, a housewife, aged 49. Her symptoms had lasted for 11 years. She had undergone hysterectomy and bilateral salpingectomy one year before examination, but these procedures had not affected her low-back pain. She had eight injections during a period of five weeks and has remained cured for five years. Her last examination was in May, 1950.

Case 6, an executive, aged 30. His symptoms, which had lasted for eight years, had begun while he was doing the high jump at college. Three years later they had been aggravated when he was loading quarters of beef. He had five injections within three weeks. He has remained cured for five years. He was last seen in December, 1952.

Case 7, a painter, aged 37, had a fall in which he fractured his skull and sprained his ankle.

Three months later sacroiliac disability was diagnosed. He received eight injections in five weeks. He has remained cured for 12 years. His last examination was in October, 1952.

Case 8, a railroad engineer, aged 63, was thrown from his engine and fractured his sacrum. Six months later bilateral sacroiliac disability was diagnosed. During a seven-week period, he received six injections on the left side and eight injections on the right. He has remained cured for 11 years. He was last seen in August, 1952.

Case 9, a housewife, aged 34, mother of two children. Her pain, which had lasted for two years, had begun when she fell while playing baseball. She had had to be carried from the field and remained in bed for three days. A general surgeon taped her back; an orthopedic surgeon diagnosed rheumatism; another orthopedic surgeon found that one lower extremity was three inches shorter than the other; a neurosurgeon advised disc operation; a professor of orthopedics, after the patient had been hospitalized for three days, consulted with a neurologist and told the patient and her husband that "her legs were equal in length, she had a weak back, and there was nothing to be done for her." These doctors were all honorable, well trained, highly regarded specialists.

The patient was given five injections in three weeks. She has remained cured for three years. She was last seen in January, 1953.

Case 10, a housewife, aged 32. The patient sustained a low-back injury in an automobile accident. Six months later she was operated upon for removal of bilateral herniated fat pads in the sacral area. After one year she still felt no relief. The bilateral sacroiliac disability was cured, with five injections on the right side and six injections on the left during a seven-week period. She then remained cured until two years later, when she lifted a tub of water and symptoms recurred on the right side. She had four injections in two weeks and has remained cured for seven years. Her last examination was in October, 1951.

Case 11, a realtor, aged 62. His symptoms, of four months' duration, had begun when he lifted a meat block into an automobile. He had been treated by a competent osteopath without relief. He had been given large doses of analgesics at home before he was able to visit the author's office. He received six injections in three weeks and has remained cured for nine years. He was last seen in July, 1952.

Case 12, a physician, aged 52. His symptoms had lasted for eight years. He had been hospitalized under the care of an orthopedic surgeon, but was still unable to work. He received nine injections in five weeks. He has remained cured for five years and has lost no time from work. He was last seen in May, 1953.

Case 13, a schoolboy, aged 15, the youngest patient in this series. His symptoms, of 15 months' duration had resulted from an automobile accident. He received six injections in three weeks and was cured. In another automobile accident two years later he sustained a fractured skull but no sacroiliac disability. He has remained cured for six years. His last examination was in September, 1950.

Case 14, a housewife, aged 24. The symptoms, which were bilateral, developed six months after her honeymoon. She received two injections on

each side, one day intervening between injections. She remained cured for two years. During her first confinement she experienced recurrence on one side; this was cured with one injection. She has had two confinements since. She now fells trees with a crosscut saw and carries wood. There has been no recurrence for six years; she was last seen in December, 1952.

Case 15, a housewife, aged 26, the mother of two children. In an automobile accident she sustained a fracture of the right femur. Four months later, when she resumed her activities, sacroiliac pain developed on the right. She had six injections in six weeks. She has remained cured for nine years; her last examination was in September, 1950.

Case 16, a female taxi driver, 40 years old. The taxi which she was driving was in a rear-end collision and she was lifted limp from it. She was found to have a sprained neck with concussion of the spinal cord and was hospitalized for four weeks. Sacroiliac pain on the right developed one week later. She was given eight injections in five weeks and resumed her former activities after three months. She remained cured for eight years.

In June, 1952, her symptoms recurred when she bent forward to lift something from the bottom of a barrel; she stated she felt a "snap" in her right hip and severe pain. She was given two injections without relief. After the third injection upward traction on the extremity with the knee and hip flexed and the patient in the supine position, reduced what appeared to be a very slight subluxation and assisted in the cure. She had been entirely free from pain for seven months when she was last seen in January, 1953.

Case 17, a life insurance agent, aged 50. His symptoms, of 22 years' duration, had begun when he was in action with the United States Army in 1918. In 1928 at an internationally known clinic a diagnosis of generalized osteo-arthritis of the spine and sacroiliac disability on the right was made. In 1940 he had an acute exacerbation of the sacroiliac disability. Roentgenograms revealed osteo-arthritis of the lumbar spine and pelvis. After four injections in two weeks he was free of symptoms and was able to do spading in his garden. His last examination was in January, 1953. At that time he had been cured for twelve years. He has never suffered or been idle because of his arthritis, although the movements of his lumbar spine are limited.

RESULTS

In the past 14 years the author has treated 253 patients with relaxation of the posterior sacroiliac ligament. During that time he has surveyed and made a diagnosis in an equal number of patients referred for examination only. Most of the patients in this latter group had hitherto had some form of treatment, but in fully half of them the sacroiliac disability had not been recognized. In this series of approximately 500 cases only one or two were encountered for which the author would possibly consider fusion operation.

Of these 253 patients treated, 53 per cent were female. The longest period of disability before successful treatment was 30 years. The longest

period of cure was 14 years. The oldest patient was aged 70 years and the youngest was 15.

A survey of the 197 cases of sacroiliac relaxation which were treated during the 12 year period between 1939 and 1950 inclusive has been compiled. An effort was made to contact each patient. Follow-up data has been obtained from 84 patients—37 by personal examination and 47 by answers to a detailed questionnaire. The average duration of disability before treatment was 4½ years. Of the 84 patients, 69, or 82 per cent, considered themselves entirely cured at the time of their last contact. Eighteen patients had been free of symptoms for 11 to 14 years, twenty-one patients have observed no symptoms for 7 to 10 years, and thirty individuals have been free of pain for 2 to 6 years.

The failures may be attributed to the following causes: (1) Diagnosis—where the diagnosis is not definite and cannot be clearly confirmed by the injection of a local anesthetic. (2) Failure of the patient to return until enough treatments have been given. (3) Treatment given in the presence of some other known or suspected disability which later becomes more aggravated although the sacroiliac relaxation may have been benefitted or cured. (4) All the patients in this series were diagnosed and treated with a 24-gauge needle 1½ inches long which failed to reach the required depth in heavier patients. A 2½ inch needle is now being used in these cases.

The percentage of failure could be reduced to a minimum if only those patients were treated in whom the diagnosis is definite and confirmed, and those cases were omitted which are complicated by some other low-back disability.

SUMMARY

1. Ligamento-sclerotherapy is valuable in the treatment of disabled joints.
2. During the course of treatment the patient usually continues his customary activities.
3. It is the author's observation that relaxation of the posterior sacroiliac ligament is one of the most frequent causes of low-back disability.
4. A careful history and physical examination are especially important to determine the seat of pain and point tenderness, and the area of referred pain.
5. Confirmation of the diagnosis is made by the injection of a local anesthetic into the ligament abolishing or relieving the pain.
6. Roentgenograms are usually of no value in determining relaxation of the posterior sacroiliac ligament but are valuable in determining congenital or acquired deformities or bone lesions.
7. Recurrences rarely occur. Complete confidence is gained.
8. In the past 14 years, 253 patients have been treated. Relief of symptoms ranging up to

14 years has been attained in 82 per cent of the cases. No unfavorable incident has occurred.

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