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The Causes and Treatment of Chronic Backache

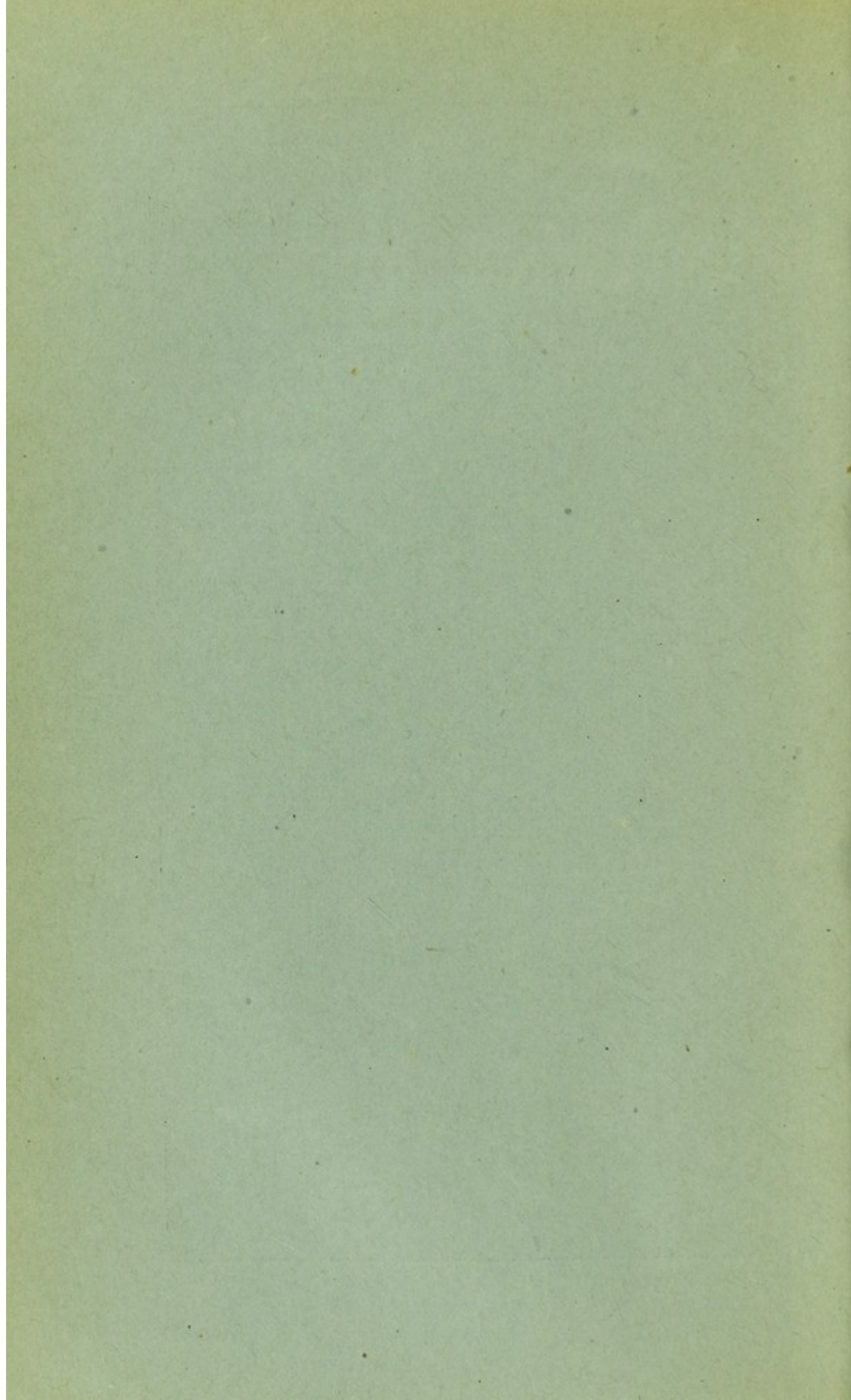
WITH A CONSIDERATION OF THE DIAGNOSIS OF
SACRO-ILIAC "RELAXATION"

ROBERT W. LOVETT, M.D.
BOSTON

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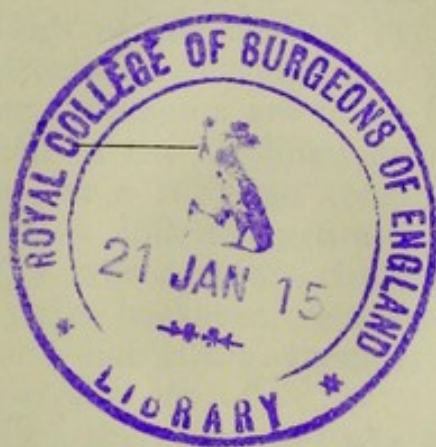


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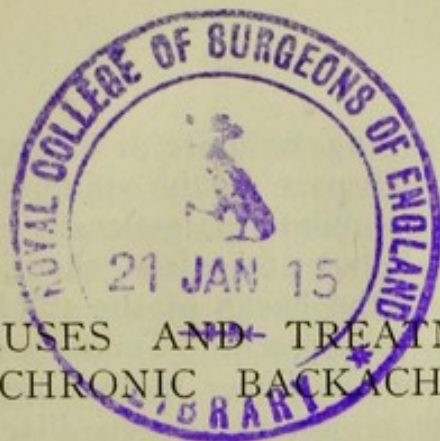
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The Causes and Treatment of Chronic Backache

With a Consideration of the Diagnosis of
the Affection



BY
J. H. H. H. H.



THE CAUSES AND TREATMENT OF
CHRONIC BACKACHE

WITH A CONSIDERATION OF THE DIAGNOSIS OF SACRO-
ILIAC "RELAXATION"

ROBERT W. LOVETT, M.D.

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That chronic backache, or chronic lameness in the back, is a frequent occurrence is a matter of common information to the medical profession, to the laity and to the manufacturers of patent medicines. The laity, as a rule, attributes such backache to "kidney disease" in men, and to that or to uterine disease in women. The writings of the medical profession on the subject have not led to a clearing up of the matter, and many confusing statements are to be found.

The more common of the various names given to this symptom-group are a sufficient comment on the situation. They are as follows: neurasthenic spine, hysteric or irritable or railroad spine, chronic lumbago, uterine backache, static backache, relaxation of the sacro-iliac joint, sacro-iliac strain, rheumatism of the spine, chronic back-strain, etc.

It seems permissible, therefore, to make an attempt to present what facts are obtainable bearing on the etiology and pathology of the symptom-group, although the results of any classification not based on post-mortem findings must always be unsatisfactory.

In this consideration tuberculosis of the spine, organic nervous disease and the results of spinal fracture are omitted.

SYMPTOMS

The routine symptoms of the affection will best identify it, and may therefore be presented in outline at this point. The most important are an insistent or

intermittent dragging, or more or less acute pain most often in the lower part of the spine, sometimes unilateral, sometimes bilateral, generally aggravated by standing or walking, and often shooting down into the buttocks and the backs of the thighs. Lameness in bending may be present. Tenderness is generally to be found over the lower lumbar region, and particularly over the region of the sacro-iliac joints. When the patient lies or sits she prefers to have the small of the back supported by a cushion. The affection may have begun slowly, or sharply with a catch in the back. Coccygodynia is not an unusual symptom. It is more common in women than in men, and is most common in three types of figure: (1) the flat-backed, round-shouldered type (the gorilla type of Dickinson and Truslow¹), (2) the type with prominent buttocks and a sharp lumbosacral forward curve (the overfeminine type of Reynolds² and the kangaroo type of Dickinson and Truslow) and (3) cases with slight lateral curvature. As a whole the resistance of these patients is less than the average; many of them are neurasthenic, and the affection is notoriously chronic. It may vary from a slight backache occurring after exertion, to a degree which makes the patient an invalid.

FUNDAMENTAL CONSIDERATIONS

Certain fundamental facts lying at the root of the problem under consideration are as follows:

1. We are studying the painful condition of an upright, jointed, weight-bearing column, supported in unstable equilibrium on the pelvis, to which it is attached by the sacro-iliac joints. This column bends more easily to the front and back than to the side, and the upright position is maintained by muscular effort. Since the upright position of the body is maintained in balance by muscular effort, and since in general muscles in their size are proportionate to the demand on them, one may obtain information as to the balance of the body by comparing the size of the muscles at the front and back of the body. The gastrocnemius is much larger than the anterior leg

1. Dickinson, R. L., and Truslow, Walter: Averages in Attitude and Trunk Development in Women and Their Relation to Pain, *THE JOURNAL A. M. A.*, Dec. 14, 1912, p. 2128.

2. Reynolds, Edward: The Etiology of the Ptoses and Their Relation to Neurasthenia, *THE JOURNAL A. M. A.*, Dec. 3, 1910, p. 1943.

muscles, whereas in the thigh the anterior muscles are developed to hold the knees extended in standing, so that anterior and posterior muscles possess about the same diameter. At the level of the pelvis, however, the great gluteal muscles have practically no anterior antagonists, and the erector spinae muscles are much heavier than the anterior abdominal muscles. The body, therefore, is to be regarded as balanced against an anterior load, as the posterior muscles are much heavier than are the anterior. That the body of the cadaver falls forward if placed erect with the knees prevented from flexing is well known.

2. The sacro-iliac joints transmit the weight of the spine to the pelvis and thence to the legs. They are ear-shaped articular surfaces of irregular contour, in general vertical in direction, containing some synovial membrane and heavy ligamentous bands. That they permit some motion is well established, but this amount of motion is small. Klein³ found that 25 kg. of force applied to the symphysis with the sacrum fixed produced a rotation of the ilia on the sacrum, which on the average, measured by the excursion of the symphysis, was 3.9 mm. in man and 5.8 mm. in woman. Measured at the sacro-iliac joint this excursion was about one-sixth of this amount; that is, in man the average amount of motion in the sacro-iliac joint, measured at the posterior part of the joint, was about 0.6 mm. These joints are protected against much motion by intra- and extra-articular ligaments of the heaviest variety. In front of them lie the lumbosacral cord and sacral plexus.

3. The spinal column itself is an intricate structure of vertebrae in contact with each other by two intervertebral articular surfaces and by four articular surfaces on the transverse processes, with of course two additional articulating surfaces for ribs in each vertebra in the dorsal region. The ligaments connecting the vertebrae are heavy and stronger on the posterior than on the anterior aspect. Here then we have a structure with about one hundred articulations and with intricate and firmly attached ligaments.

3. Klein: Ztschr. f. Geburt. u. Gynäk., 1891, xxi. Walcher: Verhandl. d. deutsch. Gesellsch. f. Gynäk., Bonn, 1891. Strasser: Lehrbuch der Muskel und Gelenk Mechanik, Berlin, 1913. Dieulafoy and St. Martin, C. R.: Assn. d. Anat., 14 Reunion Revues, 1912.

VARIETIES

Having investigated these fundamental considerations, we come to the investigation of the causes of chronic backache. We can identify clinically three etiologic classes about which there is no reasonable doubt.

1. Disease or displacement of the pelvic organs is universally recognized as one cause. Whether this is due to a direct reflex influence, or because the patient is inclined to assume a forward bent position to ease tender pelvic organs² and thus incur muscular back-strain, is not certain, although the clinical evidence would seem to favor the latter. It is often the case that in cases clearly of pelvic origin a successful operation fails to relieve the pain in the back until treatment addressed to the static side of the case is subsequently added.

2. Traumatism to the back is frequently followed by chronic backache, and a traumatic class is generally accepted. The spine with its hundred joints and complex ligamentous support is as likely to be sprained as is any other joint, and from the difficulty of fixation of the spine such sprains are as a rule imperfectly treated, and a condition of chronic irritability is likely to arise similar to what we class as chronic sprain in the ankle and knee.

3. Finally, arthritis of the spine is a painful condition universally admitted. It may be the outcome of trauma or it may arise so far as we know spontaneously. It may exist in connection with arthritis elsewhere, or it may exist alone. It may be mild or severe and occurs most often at or after middle life.

But these classes, distinct as they may appear in a theoretical classification, are not always so clearly to be identified in practice, and many cases are seen which must be recognized as a mixture of these classes or as a mixture of one of these varieties with the group next to be taken up.

Having defined and set aside cases belonging to these three divisions we have still left unclassified what in private practice in the United States constitutes a fair proportion of the cases (forty-one out of eighty-three cases in the personal series to be presented). With regard to the cause of these cases

there are two points of view: (1) that they are largely static in origin, that is, due to overstrain of the posterior musculature, and that the pain is due to irritation of muscles, ligaments and fasciae, and (2) that many of them at least are due to a specific strain or relaxation of the sacro-iliac joint or joints. It is necessary therefore before proceeding further to examine the evidence for and against these theories, so far as may be done under the conditions.

THEORY OF STATIC ORIGIN

To consider first the theory that such cases are of static origin. In a paper by Reynolds and Lovett⁴ the following conclusions were reached:

That forward displacement of the center of gravity induces increased effort of the posterior musculature (back-strain) has been demonstrated in our experimental section. That such excessive or prolonged muscular effort may be translated into pain, spasm and irritability is not only more or less a matter of common information, but may be supported by quotation of certain well-known analogous instances. If the arm is held out horizontally, after two or three minutes the muscular effort is translated into an ache. The spasm and irritability of the ciliary muscle which is overstrained to accommodate for astigmatism is well known. The pain and dragging in pronated and flat feet is generally admitted to be due to muscular and ligamentous strain.

That back-strain sufficiently long continued, induced by an unduly forward position of the center of gravity may be translated into backache seems evident.

The conclusions at the close of that paper were as follows:

We believe that static backache is essentially a mechanical disorder; that is, that it is the result of a loss of balance producing local strain on the tissues in the lumbosacral region and elsewhere in the posterior musculature. We further believe, and regard it as our most essential point, that whatever the local mechanism which produces the symptoms may be, such backache is in a large proportion of all cases not a disease in itself (as suggested by such terms as "hysterical spine," "relaxation of the sacro-iliac joints," etc.), but is a mere symptom-complex due to an abnormal attitude induced by peculiarities of the skeleton, lack of proper muscular balance, or abnormal conditions in the abdomen or elsewhere. We believe that in diagnosis the

4. Reynolds, Edward, and Lovett, R. W.: An Experimental Study of Certain Phases of Chronic Backache, *THE JOURNAL A. M. A.*, March 26, 1910, p. 1033.

local condition should be regarded as primary only after every cause elsewhere has been excluded.

The pain in the buttocks and back of the thighs is to be explained by the fact that the posterior musculature of the body is more or less continuous, and that the posterior irritation may be expressed as pain below as well as above the pelvis. This is, moreover, the reason that in such cases it is generally painful when lying on the back to have the leg flexed with the knee straight, which immediately pulls on irritable and overstrained posterior muscles.

Such a condition of pain and irritability would *a priori* be expected to occur in persons of diminished resistance or peculiar figures from continued strain of the posterior ligaments, fasciae and muscles of the back, and pain and tenderness in the neighborhood of the sacro-iliac joints occur, because here the erector spinae muscles have their origin, and pain at muscular origins and insertions is not unusual under conditions of prolonged muscular strain, as in flat-foot.

SACRO-ILIAC STRAIN

Given the conditions of such struggle against an anterior load, the result of attitudinal strain, it is not unlikely that in some cases the sacro-iliac joints may share in the process and become the seat of an irritation properly to be spoken of as a strain, and the same is very likely true of the integral joints of the spine. But to assume that there is a specific entity to be classed as sacro-iliac strain seems hardly warranted by the evidence, because all the symptoms attributed to it are more reasonably to be explained by a general attitudinal strain in which tenderness over the sacro-iliac joint or joints may be due just as well to muscular and ligamentous irritation as to joint-strain, and secondly, because the treatment to be described — a treatment generally successful — is addressed to the correction of attitudinal strain and not to the relief of a specific sacro-iliac strain.

SACRO-ILIAC RELAXATION

The assumption of a real sacro-iliac relaxation or subluxation lays itself open to a more definite line of proof or disproof, and that such an assumption is seriously made is shown, for example, in an article

by Meisenbach⁵ analyzing 84 cases of "sacro-iliac relaxation." A quotation from this article will represent the point of view:

It is now beginning to be recognized that almost all of the sciaticas are due to sacro-iliac relaxation. . . . The lumbar and sacral cords are closely related to the sacro-iliac joint. . . . The symptoms produced by any irregularity of the sacro-iliac joints depend on the pressure of the nerves involved and their distribution.

It is self-evident that a displacement of this joint severe enough to press on the nerve-trunks lying loosely in front of it must be evident to roentgenoscopy, yet — I quote again from Meisenbach — "Hertofore to my knowledge no x-ray has been published showing a dislocated or strained sacro-iliac synchondrosis,"⁶ and one has only to compare the roentgenogram of the "open" sacro-iliac (Fig. 4) of the article with the normal one shown on the opposite page (Fig. 3) to see that no evidence has in that instance been offered. In a case of Meisenbach's (Case 40) "movable sacrum" was diagnosticated by him, the symptoms being occipital headache and pain in the shoulder, the neck symptoms being attributed to "referred muscular spasms radiating from the sacrum."

In an examination of the roentgenograms taken of the eighty-three cases in my series (to be reported later) in no one was there the slightest evidence of any disturbance of relation in the joint. Post-mortem and dissecting-room evidence that this condition exists, except in connection with pregnancy and very severe or crushing trauma is so far as I know wanting.⁷

In Case 84 of Meisenbach's series a pathologic examination was made, as the patient died later of tuberculosis. The symptoms had been pain in the dorsal spine and legs following childbirth. At necropsy "some motion, but not marked, was noted." The joints were then sawed through, and by moving the ilia on each other the joints were observed to move "slightly." These findings are practically identical with those obtained in ordinary dissecting-room specimens.

5. Surg., Gynec. and Obst., May, 1911, p. 411.

6. Meisenbach: Monatschr. f. Unfallheilk., 1909, No. 3 (giving an account of eight cases of traumatic luxations).

7. Grimbach: Deutsch. Ztschr. f. Chir., October, 1908.

The symptoms ordinarily described as characteristic of sacro-iliac relaxation are so far as I know identical with those detailed earlier in this paper, except that "slipping" of the joint is said to be felt when the patient stands, for example, on one leg and flexes the other and the surgeon holds one hand on the joint and the other over the pubis, or by manipulating the crests of the ilia with one hand on each, or by forced hyper-extension of the thigh with the hand over the joint.

In my series of eighty-three cases, all examined carefully in this regard, I have failed to find any suggestion of such slipping or displacement or abnormal motion. It may be that my fingers are not sufficiently trained, but I have heard many of my colleagues confess to a similar disability. Again, in the one case seen by me in the last three years in which I believe that there did exist some slight degree of sacro-iliac displacement (Case 12), the symptoms were of a wholly different character from those described above, and were practically those of tuberculosis of the sacro-iliac joint, a peculiar sidling gait, great pain in walking and an inability to lift either leg properly in walking, with a feeling of instability.

The treatment afforded to cases of "sacro-iliac relaxation" not occurring in pregnancy, and the relief afforded by such treatment, as reported, is of itself the best evidence as to the incorrectness of the diagnosis. We have supposedly a relaxed or subluxated great joint, which bears at every step the whole weight of the body. The plane of this joint and the line of thrust on it are practically the same, that is, every step tends to thrust one joint surface along the face of the other. No joint in the body once relaxed could be so unfavorably situated for recovery while the patient is going about. Yet I quote from another author⁸ to show the treatment generally in vogue and the mechanics on which it is based:

A wide belt made of webbing 9 inches wide, extending from the trochanters up to the crests of the ilia, and encircling the pelvis and buckling in front, gives great relief by *immobilizing* the joint.

8. Pitfield: Am. Jour. Med. Sc., June, 1911.

Again:

In mild cases with a movable sacrum, high-heeled shoes may be all that is necessary (Meisenbach).

In the acute cases an adhesive plaster strapping is applied to the back to *hold the joints together* until a properly fitting belt can be made.⁹

Locally the entire principle of treatment concerns ways and means of *holding these joints together*. In the most severe it may be necessary to use a plaster spica or corset. Various other forms of *retention* apparatus are in use, and in some instances simply wearing a pair of closely fitting elastic silk trunks is sufficient. If it is desired simply to provide *immobilization* for a few days . . . one may strap the pelvic girdle firmly with adhesive plaster.¹⁰

Plaster jackets and braces of one kind and another to secure lumbar lordosis or pressure on the sacrum are also advocated.

The upshot of all this is that we are asked to believe that a pair of elastic silk trunks, strips of adhesive plaster on the skin, a webbing belt or even a plaster-of-Paris jacket will jam together sufficiently firmly to prevent their slipping by each other, these "relaxed" sacro-iliac joints. These joints, which must bear at each step a downward sliding thrust of from 75 to 125 pounds, are deeply embedded, so far as lateral pressure goes, in great masses of fat and muscle, and we are asked to believe that straps of adhesive plaster on the movable skin will "immobilize" them, that is, prevent them from slipping on each other. Here one must apply the simplest rudiments of physics and an elementary knowledge of anatomy and decide according to his individual habit of mind whether or not "slipping" of the sacro-iliac joint is likely to be prevented by these measures.

Contrasting the two theories then, we must recognize that the static cannot be proved or disproved by the Roentgen-ray or pathologic evidence; that sacro-iliac relaxation can be proved in this way, but that such proof is as yet lacking; that the symptoms described fit the static theory, and that the treatment advocated could easily afford relief in certain static cases by affording an annular ligament to the glutei muscles which hold the trunk erect on the legs, for

9. Morrill: Cleveland Med. Jour., October, 1910.

10. Swett: Yale Med. Jour., October, 1908.

the blacksmith straps up the muscles of his forearm before starting on heavy work; but it is not possible that the apparatus advocated can have the slightest effect in immobilizing a "slipping" sacro-iliac joint. That sacro-iliac strain may exist in connection with general attitudinal strain seems probable, but that sacro-iliac relaxation is a common cause of chronic backache is apparently still to be demonstrated.

The diagnosis of sacro-iliac "trouble" or "dislocation," "relaxation" or "displacement" is at present a very popular one, and eminently satisfactory to the patient, because it seems serious and unusual, and equally satisfactory to many general practitioners because it seems explanatory. Its adoption demands no etiologic study and only a routine treatment. The diagnosis of "static backache," on the other hand, means that the careful surgeon must look into the cause of it and try to remove this before proceeding to treatment. It is significant that the sacro-iliac diagnosis is but little heard of or discussed in Europe, and that foreign literature on the subject is practically lacking.

The etiology and classification of cases having thus been defined, it becomes important to consider how these theoretical considerations work out in practice, and especially in the treatment of the different groups.

I. BACKACHE OF PELVIC ORIGIN

Pelvic backache, so far as the back itself is concerned, possesses no definite characteristics to distinguish it from backache of static origin, and mixed forms are frequent. In general, pelvic backache is sacral, but may be dorsal, and is generally associated with a history of symptoms pointing to pelvic disturbance. This similarity of back symptoms in static and pelvic cases tends to support the theory that pelvic backaches are most often caused by the forward bent position mentioned above. A typical case was the following:

CASE 1.—March 10, 1910. Woman, aged 27, single, stenographer, has had dysmenorrhea always, which has been increasing for the last year, and sacral backache for one year, which is worst before catamenia. This is increased by sleeping on either side and is worse at the close of the day. Walking brings on urinary frequency up to every half hour.

Examination by Dr. Edward Reynolds showed extremely marked anteflexion of cervix, with marked overfeminine figure, and forward displacement of the center of gravity. An operation was performed by Dr. Reynolds, which was a modified Dudley's discission and straightened the cervix. Ten days later a therapeutic corset was applied, with entire relief of symptoms.

A case of mixed pelvic and static origin follows:

CASE 2.—March, 1910. Woman, aged 30, married, two children. Referred by Dr. W. H. Fitch of Rockford, Ill., and seen in conjunction with Dr. Edward Reynolds. Backache began some years ago in the second month of her first pregnancy, coming on after a fall, and after delivery it was worse than ever. She had had one attack of "lumbago." During her second pregnancy she was very uncomfortable, and in the latter part of it was unable to walk, feeling as if she would "split open," but the pain became better two weeks before delivery. The appendix had been removed without relief to the backache, and in September, 1908, there had been performed in the West an intra-abdominal shortening of the round ligaments and vaginal plastics, but the backache continued unchanged. In 1909 the discomfort became progressively worse, and she had a miscarriage which aggravated it. She was sent South for the winter, but was not relieved. She had been treated by massage and electricity. The backache was worst in the dorsal region, and more marked on the left side. It was a dull heavy pain, and had at times been sacral and at the end of the spine.

Examination shows a marked overfeminine figure, with a slight left lateral curve of the spine, which disappeared on building up the left foot. Roentgenoscopy reveals a large and apparently sacralized left transverse process on the fifth lumbar vertebra. The foot was highly arched and the gastrocnemius muscle short. Dr. Reynolds found the pelvic organs normal except that the left ovary was large, soft and low, but not very tender. The diagnosis was made of defective lateral and anteroposterior balance, probably partly owing originally to pelvic causes.

The gastrocnemius muscle was stretched on both sides, highly arched shoes with high heels put on, the left heel built up, and a therapeutic corset applied. Within a day or two the patient noted that her balance was different, and the backache began to diminish, and in two weeks had practically disappeared.

In September, 1913, (three and one-half years later) the patient returned for a new corset. She is wholly comfortable and well, and can go a day without corsets without pain, but an hour of standing without the built-up left shoe causes discomfort in the back.

II. BACKACHE FOLLOWING TRAUMATISM

In the history of many cases of chronic backache a traumatism in former years of mild or severe nature is to be found. Many of these cases without this history would have to be classed as probably due to defective balance, but the history of a trauma or overstrain in the past makes it doubtful if they belong to that class. Cases of postoperative backache apparently belong in this class.

A typical case of chronic backache following trauma is as follows:

CASE 3.—A well-built young man of 17 consulted me in February, 1909, on account of weakness, pain and discomfort in his back, which came on six months previously after a severe strain in attempting to lift the bow of a boat which had gone ashore. He had played football in one of the secondary schools through the autumn with a good deal of discomfort, and in the winter the discomfort increased so much that he applied for treatment. A corset was applied and exercise restricted. Two months later he was so much better that he was allowed to row a little, and by midsummer of that year he was able to cruise in a small boat and do all the work without discomfort. Entering college two years later he became one of the best players on the Harvard University football team.

A border-line case between defective balance and trauma is the following:

CASE 4.—January, 1908, a woman, aged 29, single, no occupation, was referred by Dr. H. C. Moffett of San Francisco. Family history was neurotic. In 1899 neuritis of arm for four years. In 1902 pain in back and coccyx following a fall from a horse. Coccyx removed in 1903 without relief, and later a second operation for resulting necrosis of bone. In 1904 diagnosis of arthritis of spine, and plaster jacket one year. Persistent pain in lumbar, sacral and coccygeal spine, increased by slightest exertion. Marked dysmenorrhea.

Examination showed the patient, pale, nervous and depressed, and the muscles were very slack all over the body. Blood and urine were normal. Left lateral curve of whole spine with relaxed standing position. Patient leans back from pelvis, lumbar region is flat.

Patient's active day was shortened and therapeutic corsets applied. Gentle recumbent exercises were given for a few minutes each day, and gradually increased. By December, 1908, she had reached gentle horseback exercise. In the

spring of 1909 she went to Europe well. She reported herself still well in September, 1910.

A very puzzling class of cases lies between the divisions of those associated with trauma and those clearly arthritic. In the acute stage even if they have a traumatic history they are not always to be distinguished from each other, but the recovery of motion under treatment in a few months, of cases apparently arthritic, leads to the belief that they could not have been due to arthritis of any degree, and it seems better to regard them as analogous to the stiff and painful feet resulting from trauma which are spoken of as "chronic sprains," and which also in their acute stage cannot be clearly differentiated from arthritis at the outset.

III. FORMS DUE TO ARTHRITIS

The recognized symptoms of arthritis of the spine are stiffness and lateral deviation of the spine, pain in the back and legs often classed as "sciatica," a loss of the lumbar curve, and in the severer cases localized disturbances of sensation in definite areas in the legs, and sometimes even some loss of motion in some muscles. The leg pains are to be attributed to nerve-root pressure, and the anatomic distribution of the pain and sensitiveness often shows nerve-root pressure rather than an involvement of the whole sciatic nerve. Pain is noticeable on movement, and a "catch" in making some slight movement frequently occurs at the onset, and often in the course of the affection. A history of recurrent "lumbago" is frequent.

Roentgenoscopy reveals in some cases the presence of osteophytes in the vertebrae, and "lipping" or overgrowth of the vertebral edges; but in other cases presenting exactly the same symptoms no such changes are to be found, yet their long-continued course and recovery with stiffness of part of the spine suggests that the latter are also arthritic.

CASE 5.—An overworked architect of 38, previously healthy, was seized, Dec. 9, 1910, with a pain in his side while riding on a train. He had previously had some attacks of what he called lumbago. December 20, after being warm, he was chilled on an automobile ride, and on December 21 collapsed with acute pain in the back. He was seen by an orthopedic surgeon, who made a diagnosis of sacro-iliac displacement and applied a plaster jacket. This was removed

in three days, as it proved intolerable, and he was taken to a hospital two weeks later. Here he remained three weeks without benefit, being treated by massage, electricity and baking. He was seen by me in consultation with Dr. J. J. Putnam, Jan. 24, 1911. The back was stiff, flat and very painful, there was an area of anesthesia over the great toe on the right foot and hyperesthesia over the outer dorsum of the foot. The leg was much atrophied, and both kneejerks were increased. A corset was applied, and after some weeks the patient was able to resume work. In March, 1912 (fourteen months after the attack), he reported that he had discarded the corset for three months, that he was stiff in the morning, and that the anesthesia in the foot persisted. The corset was reapplied and worn for some months. In March, 1913, he reports that he is perfectly well, does what he likes, never thinks of his back, and the only reminder left is a slight numbness of the right great toe.

In this case no osteophytes or lipping of the vertebrae were to be seen on the roentgenogram, but the disturbances of sensation in the foot pointed to nerve-root pressure, and warranted the diagnosis of arthritis.

Another type of case in which roentgenoscopy did show osteophytes and lipping was the following:

CASE 6.—An active single woman of 36, who said she had always been "rheumatic," was referred to me by Dr. G. L. Walton in May, 1912. For two months she had had "lumbago" in the back, and had had in all some six or eight similar attacks. She was very one-sided, and had great pain in the right leg at night; the back was flat and stiff. Plaster strapping was applied without much relief, then a therapeutic corset with similar result, and then over the corset a steel back brace, which gave some comfort. These were both worn night and day. In July the patient was much more comfortable and the back was less stiff. In October, 1912, she reported that she had no further trouble in either leg or back, but that without support the back was a little stiff. She was instructed to discontinue gradually support from the brace.

IV. CASES DUE TO DEFECTIVE BALANCE

These may be classed as (1) those due to defective lateral balance, and as (2) those due to defective anteroposterior balance.

Lateral Defects in Balance.—If one leg is longer than the other, the pelvis must become oblique and the spine curved to one side in standing, and the muscles of one side (generally on the convex side of

the curve) are under more strain than those of the other side. This is the simplest form of backache due to defective balance. The pain and discomfort will be most noticeable in standing and walking, and will in many cases be marked over the sacro-iliac region, oftenest on one side. In susceptible persons only a slight degree of lateral curve may be required to produce such backache.

CASE 7.—A clergyman, aged 40, consulted me in 1910. He had always been conscious of his back, even as a boy, having had pain in the lower part of the back and at the end of the spine. For the last two or three years the backache has been decidedly worse, and he now has great discomfort in the lumbar spine in standing and walking; there is no pain in the feet, legs or thighs. After preaching he becomes exhausted, and his nervous endurance is poor. Examination shows a marked lateral curve of the spine to the left, due to 1 inch shortening of the left leg from an unknown cause. This was corrected by a high sole on the left boot, and relief from the backache came in about three weeks, accompanied by very marked improvement in general health and endurance. Two months later he was practically well, and has remained so.

Defective Anteroposterior Balance.—The simplest type of this variety of backache is shown when the abdomen is so large as to cause a serious anterior load.

CASE 8.—A man of 55, in active business, vigorous and athletic, was referred to me in July, 1912, by Dr. S. J. Mixter of Boston, for a persistent lumbar backache of many years' duration, which came on in standing and walking but not in horseback riding. It was so severe that the patient had recently avoided all possible standing and walking. The back was flexible, but the back muscles were spasmodic and hard to the touch. The abdomen was very large and lax. A close-fitting corset was applied to support the lower abdomen, and immediately partial relief was felt. In two weeks the pain had disappeared, and a year later the abdomen was smaller and much less lax, and there was no pain whatever unless the corset became loose. At this time the patient was given exercises for the abdominal muscles.

That defective anteroposterior balance may be manifested by pain in other posterior muscles than those of the back is shown in the following case:

CASE 9.—Woman, aged 25, single, referred in June, 1909, by Dr. Ansel G. Cook of Hartford, who had at one time treated her, complained of great discomfort, especially at

the back of the knees, aggravated by standing and somewhat by walking. The pain was attributed by the patient to varicose veins, and she had many cramps, especially in the right leg. The patient stood with an increased curve in the lumbar region, and there was a loss of dorsal flexion in both feet. The gastrocnemii were stretched, higher heels were put on the shoes, and a therapeutic corset was applied. The patient was dissatisfied with the opinion that varicose veins were not the cause of her trouble, and disappeared. In December, 1910, she returned to report that she had had complete relief of all her symptoms shortly after her first visits. When the therapeutic corset wore out and failed to give her support she had much trouble again in the legs, but on getting a satisfactory corset again the pains in the back of the legs disappeared.

In other instances, anteroposterior balance is disturbed by flat-foot and similar conditions, which, by affording an abnormal base of support, induce back-strain.

CASE 10.—A healthy and vigorous domestic servant, aged 30, consulted me in 1907 for a flexible flat-foot, which gave more trouble in the hips and back than in the feet. Flat-foot plates relieved the pain in the hips and legs, but the backache was so severe that a corset and shoulder-straps were applied, which finally relieved the pain in the back. The patient remained comfortable till 1912, when some friends induced her to discard the plates and wear a boot with a low heel and flexible shank. In two weeks the backache became intolerable, and she was unable to work for a day or two. She reapplied the plates, and her symptoms disappeared.

Backache due to relaxed and slumped attitude is perhaps the commonest type of static backache.

CASE 11.—July, 1908, a girl, aged 15, reported that for some years she had had pain in the hip and sacral backache, diagnosticated as sacro-iliac joint affection. The general attitude was bad, the spine being decidedly rounded in the dorsal region. The spine was tender to the touch, and the girl's endurance was poor, the patient having been out of school for a year and a half. She returned for treatment in September, 1908. She was given a therapeutic corset and started on exercises, which she did daily. Setting-up exercises of a very gentle character were at first given in the recumbent position, and were made more forcible and given in the erect position. After two weeks' treatment the patient was allowed to go home, with directions to lie down half an hour in the afternoon, to take half an hour

of active exercise outdoors three times a week, to pursue the exercises, and to go to bed at 8 o'clock each night. The pain in the back gradually disappeared, and after a few months there was no further trace of it.

Finally, there are cases apparently due to defective balance in which the pelvic organs are normal, there is no history of trauma and no reason to suspect arthritis, and yet no gross malposition in the standing position is to be detected. It must be remembered with regard to these cases that we have as yet no reliable normal for the upright position to guide us, that individual variations are many, and that in a given person it cannot be said that he or she stands in such a way that back-strain is not to be considered.

FREQUENCY OF DIFFERENT FORMS

Having thus presented the types of backache with which I am familiar, I proceed to the analysis of 83 cases seen by me in 1912 in private practice either at my office or in consultation, in order to see what they show as to the relative frequency of the different forms. Of these cases 29 were males, and 54 females. In age, the patients ranged from 10 years to over 70, with a fairly even distribution by age periods, but rather more frequent between 15 and 20 and between 35 and 50 than at other ages. As to duration, only 6 were of less than six months, 14 were from six months to a year, four were from ten to fifteen years, and 9 were said to have lasted "many years."

As to the classification into the groups described I found as follows:

Lateral defect in balance, 10, (three of these occurring in bony lateral curvature).

Anteroposterior balance, 31. (Five were due to large abdomens, and in fifteen cases there was some static error in the feet which seemed to have an influence on the defective balance.)

Pelvic, 6.

Traumatic, 20. (Five of these were associated with obviously bad standing positions, but in the others the trauma seemed the only cause.)

Arthritis, 15, (in which must be included two cases of "recurrent lumbago" probably arthritic).

Acute lumbago, 1. (This case was too acute to determine the division to which it belonged.)

The case which was spoken of early in the paper, in which I believe that a lesion of the sacro-iliac joint occurred, was the following:

CASE 12.—A healthy woman of 40, of athletic habit, in the fall of 1911 was standing bent over her dog, which she was washing. Her trunk was horizontal, and with one hand she was holding the dog, when with the other arm she reached up and to the right to get a piece of soap. Something snapped in the right side of the back low down, and when she tried to stand erect it was done with difficulty and with much pain in the right sacro-iliac region. Walking was accomplished with much pain. She had to keep rather quiet, and was treated by an osteopath for a week without relief. When she sent for me I found marked tenderness over the joint, pain in movements of the right leg, especially in walking, and a sidling gait much like that seen in tuberculous disease of the sacro-iliac joint. The back was strapped with adhesive plaster, not with any idea of fixing the sacro-iliac joint, but for the same kind of support that one would give a sprained ankle by a sticking plaster or cloth bandage. Walking was forbidden, and a tight-fitting corset made and worn day and night. More exercise was gradually allowed, followed by massage and exercises for the back muscles, and in six weeks the patient was sufficiently well to resume fancy dancing, which was her means of exercise. There has been no return of the trouble.

DIFFERENTIATION

If a case is traumatic in origin and if the sacro-iliac joints are normal in the roentgenogram and to the touch, it is to be assumed that the muscles, ligaments or joints of the spine or of the spine and pelvis have been sprained, and that the condition is similar to that of the sprain of any other joint. If the case is not traumatic in origin, lateral and anteroposterior balance are to be investigated, and static errors in the feet must be remembered as one cause of defective balance. The round back and the overfeminine figure seem especially prone to static backache, but the diagnosis of this type must sometimes be made in the absence of gross malposition.

In all cases in women the possibility of a pelvic cause must be borne in mind, and an inquiry into symptoms indicating pelvic disorder may lead to a conclusion that a competent cause for the backache exists there. The case must be classed as probably arthritic when it is chronic and there are marked

stiffness and pain in motion, with muscular spasm and secondary lateral curvature. Referred pains in the legs and disturbances of sensation are suggestive. A fair-minded surgeon, however, must sometimes confess that he cannot classify the case with certainty.

The coexistence of neurasthenia or psychasthenia does not invalidate the diagnosis, and the diagnosis of hysteric or neurasthenic spine is no diagnosis at all.

PROGNOSIS

Since I have investigated and attempted to classify my cases more closely, my results and prognosis have been much more satisfactory. In balance cases I give a favorable prognosis under proper treatment unless the patient is neurasthenic, in which case I am extremely guarded and doubtful in my own mind as to the outcome. Cases clearly pelvic in origin should not be treated by the orthopedic surgeon of course; cases clearly traumatic are favorable as to prognosis except in elderly persons and in those undertaking litigation. In arthritic cases seen fairly early I look for recovery from pain with a spine more or less stiff, and I expect them ultimately to give up support.

The results in the eighty-three cases seen by me in 1912 are tabulated from my records as follows: cured, 33; improved, 10; relieved, 24; failure to relieve, 4, and no final note, 12.

TREATMENT

The treatment of the pelvic variety belongs to the gynecologist, but it must be remembered that there are often border-land or mixed cases, and that treatment of the static element may be subsequently required, and in certain mixed cases in which either the static or pelvic element may be considered a competent cause, it may be desirable to try the mechanical treatment before proceeding to operation, provided the patient is aware of the situation.

The treatment of arthritis of the spine consists in fixation of the spine, and my personal experience has led me to regard the plaster-of-Paris jacket for this purpose as uncomfortable and on the whole unsatisfactory. A canvas corset, lacing in the back, reinforced by light steel straps, has proved much more efficient and adaptable. In the severest cases a leather corset or steel back-brace may be required.

The treatment of traumatic cases does not differ essentially from that of the arthritic cases just described in the severer cases, or in the lighter cases from that of the static cases to be discussed next.

In the treatment of static cases unilateral defects in balance should be carefully studied, and if present, as shown by a lateral curve of the spine (generally slight), should be corrected by elevating one heel. Static disturbances of the feet, as shown by pronated feet or by feet with short gastrocnemius muscles, should be corrected. The general condition must be inquired into, and so far as practicable, overstrain and faulty habits of life remedied. Recumbency for part of the day is desirable in most cases, and severe cases at first should be recumbent for most of the time.

The mechanical treatment of static cases here advocated is based on the experimental work of Reynolds and Lovett, and on clinical experience. This work showed that a properly fitted corset threw the center of gravity of the body back, and that this effect was reinforced by high-heeled shoes; consequently, in cases presumed to be due to a forward displacement of the center of gravity of the body, and to resulting posterior muscle-strain, the application of a properly fitted corset is the most important part of the treatment. Muscular training might be supposed to be the first requisite, but we are dealing with overused and irritable muscles which first demand rest and support, and as a rule the immediate use of gymnastics and back-massage is unsuccessful and irritating.

The requirements of a therapeutic corset are as follows: 1. It should be tightest around the bottom, and the circular pressure should diminish from the bottom to the top, where it should be loose. In this way abdominal support is afforded and the circular constriction around the glutei, already spoken of, is furnished. 2. It should be straight in front. 3. It should support the hollow of the back. 4. It should not press forward against the back at the top. A therapeutic corset does not require heavy steels to make it efficient, but its proper effect depends on the cut of the cloth and the lines of strain, and the manufacture of such a corset lies within the capacity of any good corset-maker. Ready-made corsets may in

many instances be adapted to the proper requirements. For men, a heavier canvas corset, reinforced as may be needed by light steels, is preferable to the lighter woman's corset. The heels of the shoes should in most instances be raised an eighth or a quarter of an inch. As the back quiets down, gymnastic exercises and massage of the back are desirable, and such exercises should be aimed at teaching the patient to learn to assume and to hold a more normal standing position. The electric light is often of value.

CONCLUSIONS

This paper is a plea for a careful etiologic study of each case of chronic backache or lameness of the back, and an attempt to present a classification which is very crude, but which has worked out satisfactorily in practice. Cases have been cited to show the variety of symptoms and the way in which treatment has or has not been successful. The popular diagnosis of "sacro-iliac relaxation" has been commented on, and attention has been called to the fact that adhesive-plaster straps on the skin cannot possibly "immobilize" relaxed sacro-iliac joints which at every step must bear the weight of the trunk as a downward thrust, and that the fact that treatment of this sort often relieves symptoms is fair evidence that the diagnosis in such cases is incorrect.

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