

PHYSICAL THERAPY ON LOW BACK PAIN AND SCIATICA

An Attempt at Evaluation

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ABSTRACT. The authors present the accepted theories behind the etiology of the sciatic pain syndrome. The difficulties of evaluating the results of different methods of treatments are discussed. A matched group study carried out in order to investigate the effect of certain physiotherapeutical treatments are described. The results show a significant priority for the group that was treated with intermittent pelvic traction combined with isometrical training of the abdominal muscles.

Physical Therapy is a generally accepted and applied mode of treatment for low back pain and sciatica. In this connection the concept includes a variety of therapeutic techniques. Many research workers advocate the use of muscle-strengthening exercises, mainly aimed at the back extensors (5, 15), whereas others favour passive or active movements in order to increase the mobility of the spine (20, 21). Heat in form of hot packs or short waves is used separately or in combination with other alternatives of treatment. Hydro- and balneotherapy in various forms is common on the continent but has hardly found its way into Scandinavia. Traction, applied with different techniques (9, 11, 13), earlier frequently employed in the Anglo-Saxon countries, is gradually being more used in Sweden. The time-honoured, classical soft tissue treatment, massage, still has a place in the therapeutic arsenal in many areas.

The attempts to dissolve a postulated mobility loss within a particular dorsal segment, which has been localized with a special method of examination by means of manipulatory techniques, constitute an individual form of physical therapy (4).

There are two factors that are characteristic of all these therapeutical methods: All are said by their exponents to have good effects. Research,

which would tend to substantiate this, is largely lacking.

The explanation of the first statement is, of course, that the painful low back syndromes that are being treated, have a distinctive tendency to spontaneous recovery, either temporarily or definitely.

There are several explanations of the second point. One is the present failure of research by means of chemical, electrophysiological or micro-anatomical techniques to clarify the structural changes behind the symptoms. The theoretical thinking behind the various forms of treatment is either nonexistant, diffuse or controversial.

The most frequently used method consists of strengthening exercises for the back and lately also the abdominal muscles. This is based on the theory that the discs, ligaments or other structures responsible for pain are thereby exonerated. One creates a corset of muscles (16). A treatment aimed directly at the muscles might even influence the pain, caused by contractures. Both these points of view are hypothetical, lacking theoretical foundation.

Hypothetical is also the supposition that an increased mobility of the spine, wholly or within a certain segment, might materially influence the feeling of pain (4, 20). On the contrary, certain biomechanical observations show that an extensive mobilization increases the stress on the lumbar segments (12, 14, 17).

The Fowler position implies that the patient is placed supine with hips and knees flexed. We have the hypothesis that a spasm of *M. iliopsoas* could be of importance (1, 6, 19).

A pressure on the nerve root is the most ac-

Table I

	I	II	III
Total no. of patients	21	20	21
Men	10	10	9
Women	11	10	12
Age	24-60	21-61	23-61
Median age	43	40	39
Manual labourers	5	5	5
History > 1 year	11	8	13

cepted cause of sciatic pain. When a prolapsed disc without rupture of the annulus gives this pressure, a stretching of the long posterior ligament might be considered to change the mechanical conditions of the spinal canal. Considerations of this sort are at the back of the traction treatment (10).

The scantiness of theoretical foundation partially explains the second essential reason for the meagre documentation typical of physical therapy: the difficulty of evaluating the effects of the therapeutical efforts. Mobility and muscle strength are possible to measure objectively up to a point. Pain is, however, for the patient the most important factor which decides if he can function socially or not. In order to evaluate this symptom, one is restricted to what the patients say. This can be influenced by several factors.

The evaluation that the clinical investigator makes on the ground of a certain treatment thus implies the following: the palpation, the mobility tests and the possible neurological findings are put in relation to the verbal statements of the patient to reach a comprehensive judgement. This is, of course, a subjective estimation. To-day, however, the only possible one.

MATERIAL AND METHODS

The difficulties to analyze the physiotherapeutical methods of treatment do not remove our duty to carry out running product controls with the methods available.

This study is an attempt to evaluate two different kinds of treatment:

I. *The conventional treatment* consisting of hot packs and massage in combination with mobilizing and strengthening exercises for the spine.

II. *The alternative treatment* where, although intermittent pelvic traction dominated, isometrical training of the abdominal and hip extensor muscles also was included.

III. *The control group* treated with hot packs and rest only.

The sample consisted of routine cases selected from the clientele at the orthopedic out-patient clinic.

The selection was made by the orthopedic surgeon who also participated in the research.

Assigned to the physiotherapist were patients who had low back and sciatic pain radiating down one leg for more than one month's duration. While most acute sciatic attacks with a strong tendency to spontaneous recovery, become more or less free of pain in a couple of weeks, one month's duration of symptoms was considered sufficient for eliminating these cases. Irradiating pain down to below knee level and positive Lasègue sign were recorded. Neurological loss symptoms were present in single cases. Patients strongly suspicious of the presence of a disc prolapse were not accepted. The total number of patients was sixty-two.

Pertinent clinical data are seen in Table I.

The orthopedic surgeon made a clinical routine examination of the patient, including a spinal radiograph. He was then placed by the physiotherapist in one of the three groups according to a randomization procedure decided upon before the experiment (2).

The duration of the treatments, which naturally were carried out within the limit of pain, was one month, and the number of treatments was ten.

The evaluation of the results followed two lines. The approximately measurable changes of muscle strength and of mobility were registered by the physiotherapist. The patient's own opinion of the treatment was simultaneously registered, as well as the use of analgetics before and after the treatment period.

The assigning orthopedic surgeon made the conclusive clinical evaluation. He was not cognizant of the premisses for the investigation. The results were tabulated in three groups: noticeable improvement, status quo, noticeable change for the worse. The patient's ability to function socially was a decisive factor in making the clinical evaluation. In judging the results from group A, two factors were considered—whether the patient actually had gone back to a normal activity or if he had expressed himself capable of doing so.

The remaining subjective symptoms were thus of decisive importance in judging the results. A remaining rigidity with positive Lasègue sign was considered of less importance.

The different methods of treatment were:

I. *The conventional treatment.* (a) Hot packs on the back 15 min. (b) Massage on the paraspinal muscles. (c) Mobilizing exercises, prone kneeling and supine lying positions. (d) Strengthening exercises for the back and abdominal muscles, performed isototonically. (e) Regimental dispositions. The patients were also asked to perform the exercises at home.

II. *The alternative treatment.* (a) Instruction on Fowler position to be assumed at home (Fig. 1). (b) Strengthening exercises, performed isometrically against maximum resistance 6 times each. *Abdominal muscles:* Crook-lying: vertical pelvis lift, while flattening the lumbar lordosis. Resistance on the knees (Fig. 2). Crook-lying, feet supported: sit-up against resistance 30° (Fig. 3). *Hip extensor muscles:* Prone-lying, knees flexed 90°: knees lifting against resistance while pressing down the anterior hip

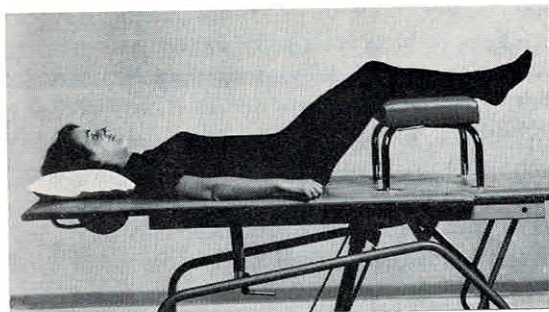


Fig. 1.

bones (Fig. 4). (c) Intermittent pelvic traction. The patient is placed on the Tru-trac traction table, in a Fowler position (Fig. 5). Traction duers 20 min, with 4 sec hold intervals and 2 sec rest. The traction force is correlated to the patient's weight according to the following figures:

The patient's weight, kg	Traction force, lbs
50	58
55	61
60	63
65	66
70	69
75	71
80	84
85	86
90	89
95	92
100 and more	95

The patient rests on the traction table 10 min after the treatment. (d) Regimental dispositions. The patients were asked to perform the exercises (b) every day at home.

III. *The control group.* The patients were placed on a hot pack for a length of time corresponding with the average for the other methods of treatment. They have not received regimental rules.

Muscle tests

59 patients out of 62 were tested. Three patients were prevented to perform the tests due to their pain.

Abdominal muscles: crook-lying, feet supported: sit-up.

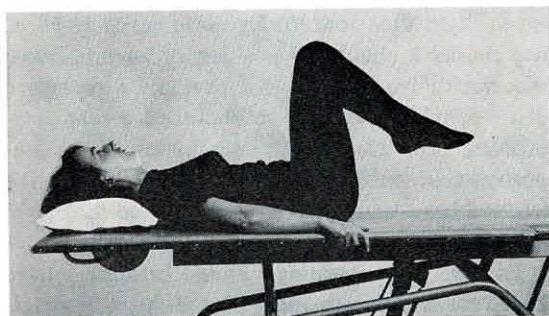


Fig. 2.

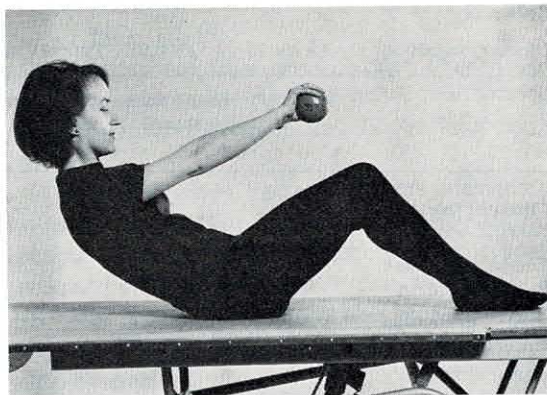


Fig. 3.

The load, e.g. resistance was increased by placing the arms differently, according to the muscle strength.

Back extensors: prone-lying, upper trunk outside the plinth unsupported. The horizontal position was to be maintained while various loads were placed on the back. Legs stabilized on the plinth.

In both cases the patients were to endure the resistance for 6 sec.

Mobility tests

58 patients were tested. The distance between the fingertips and the floor when bending forwards and sideways—knees extended—was measured in cm.

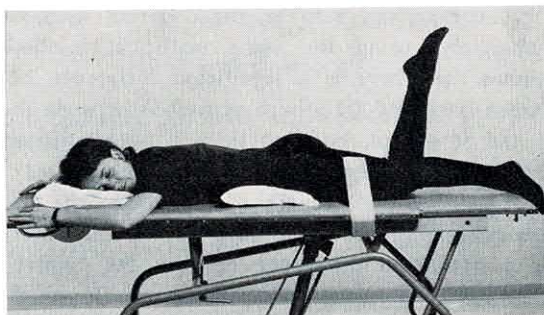


Fig. 4.

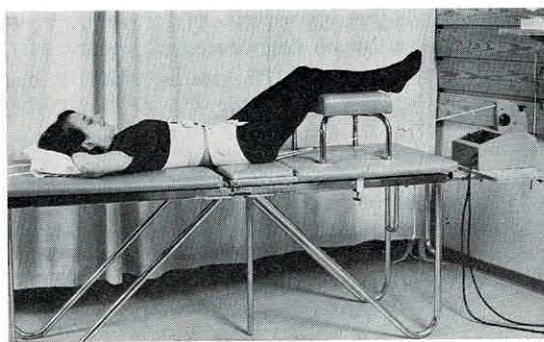


Fig. 5.

Table II

Clinical evaluation: $\chi^2=13.70$; $df=4$; $p<0.01$. Patients' opinion: $\chi^2=13.51$; $df=4$; $p<0.01$. $N=62$.

	Conventional treatment I	Alternative treatment II	Control group III	
Clinical evaluation	9	17	12	Noticeable improvement (A)
Patients' opinion	10	18	14	
Clinical evaluation	8	3	9	Status quo (B)
Patients' opinion	7	2	7	
Clinical evaluation	4	—	—	Noticeable change for the worse (C)
Patients' opinion	4	—	—	
	21	20	21	62

The statistical analysis (made by Professor Chris Otander, Ph.D.) is based upon the clinical evaluation by the orthopedic surgeon. The probability calculations were expressed in chi-square (χ^2) and *t*-test with Degree of Freedom (df). Level of significance was set at 1%.

RESULTS

As seen from Table II the effect of the II group treatment, e.g. the alternative treatment, shows a significantly greater improvement than those of the I, e.g. the conventional treatment, and the III e.g. the control group.

A comparison between the different methods separately, using the same statistical method, shows that there is a significant difference between the I and III groups as well as between the I and II groups, but that there is *no* significant difference between the II and III groups.

Regarding the strength of the abdominal and back muscles, the tests have shown that there is a significant difference between the "active" methods of treatment, e.g. the I and II groups, on one hand and the control group III on the other hand. The I and II groups do not differ significantly within themselves. The mobility of the spine of the II group had decreased significantly, in relation to the I and III groups, where it had increased after the treatments.

Table III. Need for analgetics before and after the treatments

	I	II	III
Before	12	9	9
After	7	—	4

The need for analgetics is tabulated in Table III. The patients had not taken any pills on the day of examination and tests.

Of the 30 patients who were taking pills before the treatments, 7 in the conventional treatment group and 4 in the control group were still taking them, whereas no one in the alternative treatment group was using pills after the treatments.

DISCUSSION

In these often lengthy periods of pain, the biological process is characterized by intervals of spontaneous remission and activity. The prognosis is generally good in the long run. Thus, the value of the therapy used will be markedly dependant upon at which stage of the ailment it was applied (8). It seems however, that the alternative treatment has, to a higher degree than in the other methods of treatment, reduced the subjective symptoms of the patients.

The interpretation of the mechanism behind the effect of a treatment of this kind is necessarily almost unattainable. The reason for this is that our knowledge of the pathophysiology of sciatica is too slight. It is conceivable that one, by traction, has caused a change of position of an intraspinal spacerestrictive process—for example a prolapsed disc—or of its size, and so abolished a root compression (10, 23). Worth mentioning is the importance of sufficient pull and duration of the traction in order to effectively influence the mechanical conditions of the spine (3, 11, 24).

Earlier, the treating physiotherapists have aimed at a strengthening of the back muscles; one has strived to create a corset of muscles.

Several authors, however, have questioned this purpose and pointed out that an overambitious isotonic training has been of doubtful value (12, 14). The results of this study tend to verify this point of view, and indicate that an increase of dorsal muscle strength is not parallel with a decrease of pain. Biomechanical investigations of the pressure in intervertebral discs by discometry have rather pointed to the importance of a well functioning abdominal muscle wall as an unloading factor (17).

The increased activity in the M. iliopsoas that has been recorded electromyographically, could add as a compressive force on the lumbar spine (18). According to these observations, the patients in the alternative treatment group have been instructed to assume a psoas-relaxing position, the so called Fowler position, as an essential part of the routine.

The traditional low back therapy has earlier aimed at an increased mobility of the spine. It is therefore interesting that in the present sample the diminished subjective symptoms after the alternative treatment are accompanied by a certain loss of mobility. This fact corresponds well with the opinion of those authors who believe that an inflammatory irritation around the intervertebral disc plays an important role for the development of pain. They therefore advocate reduced physical activity or even immobilization (8, 25).

To sum up, this study has shown, that when treating a sample of sciatic pain of varying duration, it is of great importance to use a routine, where, in order to reach an ultimate state of painlessness, consideration of the biomechanical observations has been taken.

The essential points in the treatment are traction, isometrical muscle training and immobilization.

At the present stage of research, the explanation of the effects observed must remain in a field of speculation.

SUMMARY

An attempt to evaluate different methods of physical therapy now available on low back pain and sciatica has initiated the following investigation.

62 patients with similar symptoms of sciatic pain were clinically examined by an orthopedic

surgeon, and then randomized and allotted into one of three groups.

One group has been given "conservative treatment" e.g. hot packs, massage, active mobilisation of the spine and strengthening of the back muscles.

The second group has been treated with intermittent traction (Tru-Trac traction table) of the lumbar spine, using the traction force recommended by B. Judowich 1954 plus an additional 30-40 lbs. These patients have also been instructed on psoasrelaxing position (Semi-Fowler) and isometric training of the glutei and abdominal muscles.

The third group—the control group—has had no treatment at all. There were 20-21 patients in each group. They were given the same kind of analgetics, and they were X-rayed at their first examination by the doctor.

After one month, during which ten treatments had been given, they were all examined by the same doctor. At this stage the physician in question was naturally not cognizant of the premises for the investigation.

The results of this investigation are shown, indicating a statistically significant priority for the second group.

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