

PHYSIOTHERAPY FOR LOW BACK PAIN PATIENTS

A critical look

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The low back pain problem does not involve matters of life and death but is still of great importance for many millions of patients and its socio-economic influence is vast.

Unfortunately, in most of the patients, the true cause of this ailment is unknown. A large literature exists on the subject, but all we can say to-day is that the intervertebral disc has a probable role in the production of the pain (7, 11, 23, 26, 32, 36, 39, 51, 59, 64, 80, 91, 93, 94, 98). This structure is the site of a number not fully understood chemical changes, chiefly on the mucopolysaccharide side (5, 10, 14, 28, 41, 76, 80, 82, 85). To a large extent these probably depend on the known lack of vascularity of the disc after the age of 20 years (7, 25, 40, 59, 90, 94). The lumbar spine is also subjected to heavy mechanical stresses which were previously regarded as the most important factor for disc derangement (59, 39, 90, 91).

Evidence exists that patients with back pain often exhibit symptoms arising from several parts of the spine (46, 48, 49) and therefore more generalized chemical disturbances as well as genetic factors have been discussed (34, 39, 80, 81, 85, 95). It obvious that symptoms most commonly arise from areas subjected to relatively higher amount of mechanical stress (1, 7, 23, 80, 91, 94, 98). This also occurs among animals (33, 34, 81).

On top of all these unknown factors the individual sensitivity to pain is different and probably explains why some sufferers come for treatment, while many others with the same type of back pain never do (46). The psychogenic perpetuation of organically induced pain (6, 86) is nearly impossible to evaluate as indirect emotional factors are involved (86, 95).

Although the disc itself by most authors is believed to be the origin of pain other structures in the area also have their advocates in the etiologic discussion (2, 55, 66, 84, 87, 89, 98).

Furthermore our ability to verbally communicate about this problem is also hampered by the subjectivity of terms like low back pain, lumbar insufficiency, lumbago, lumbago-sciatica, lumbalgia, fibrositis, back strain etc.

Against this background of unanswered questions the physician facing his patient is mostly reluctant or incapable of explaining his lack of knowledge, which makes it quite conceivable that most of us turn into some "religious" belief.

We believe in bed-rest, in analgesic, muscle relaxing or anti-inflammatory drugs, in heat or cold, in manipulation, in spinal fusion or in different types of remedial exercises just to mention a few of the most commonly used recipes for low back pain patients.

Irrespective of the type of treatment given, 70 to 80% of the low back pain patients will recover within 2 months' time (18, 46, 49), and with very few exceptions, attempts to statistically prove the advantage of one method over one or several others are nonexistent. For the scientifically minded this lack of controlled series to prove the benefit of any type of treatment given is amazing and becomes even more so when one experiences the assured attitudes of the advocates of certain types of "cures".

In the therapeutic field to-day the introduction of a new drug is practically impossible without clinical and laboratory tests to prove its effectiveness and we are increasingly alert and critical to different types of pharmacological side effects.

The same stand should be taken with regard to

the different forms of treatment of low back pain and our present methods should be given a critical look.

The purpose of this review is to critically evaluate physiotherapy for these patients. The broader concept of this term will be applied, i.e. the discussion will include isotonic, isometric and manipulative procedures as well as the ergonomical aspect. Different types of physical therapy, e.g. roentgen, ultrasound, short wave diathermy, heat or cold will not be considered, but it should however be pointed out with regard to all these methods that their benefit for low back pain patients still remains to be demonstrated in controlled series of patients. On the contrary, some authors have on the basis of their studies been unable to show any significant clinical effect (1, 30, 32, 46).

As stated above it is quite likely that both chemical and mechanical factors must be considered in an etiological discussion of low back pain. While the chemical factors responsible are largely unknown we are increasing our knowledge about the mechanical ones (3, 9, 15, 16, 17, 19, 20, 21, 22, 26, 27, 37, 38, 42, 43, 50, 65, 69, 70, 72, 73, 74, 77, 79, 84, 88, 96). Intrathoracic and intraabdominal pressure measurements (3, 16, 19, 20, 69) provide more reliable figures of the load on the lumbar spine than those obtained from theoretical calculations (4, 7, 68, 71, 84, 94). Further information has been obtained, through autopsy experiments as well as direct intravital disc pressure measurements, of the load to which the lumbar discs are subjected in different static as well as dynamic situations of the body (72, 73, 74, 76, 78, 79).

In most clinical series of low back patients a relatively high percentage of these will report that sudden mechanical stresses precipitated their symptoms or aggravated the existing ones (1, 7, 46, 49, 51, 91). Thus situations of increased mechanical load, if not always directly offending, nevertheless increase the pain in most subjects.

It should be clear from what has been discussed above that with our present knowledge it is almost impossible to recommend a proven effective program of physiotherapy for every one of our patients.

Since we know which particular situations increase the intradiscal pressures and thus the load on the disc, our guide should be to avoid those

types of movement or exercises that induce stresses, which according to our present knowledge may produce permanent deformation within the "motion segment" (9, 19, 21, 22, 26, 27, 42, 43, 84, 96).

Emphasis is sometimes placed on the posture of the patient and different exercises to decrease the lumbar lordosis or the pelvic tilt have been recommended (11, 60, 98). Although from a mechanical point of view a straight back shows slightly less intradiscal pressure ($< 1 \text{ kg/cm}^2$) than a lordotic one (73), the effectiveness of these programs remain to be proven. It has actually been demonstrated that the lumbosacral angle which varies in different subjects is of no clinical importance, unless the angle is well above 60° (in men) and 80° (in women) or below 0° (12). That same study also demonstrated the difficulty in altering the postural habit in any of the subjects even after intensive attempts with different exercises.

From a purely mechanical point of view there is definite evidence (77, 79) that the best relief is obtained in the supine position, which is also recommended by most orthopaedic surgeons (1, 32, 46, 80, 95, 101). From a theoretical point of view the semi-Fowler position (11,98) with its decrease of the lumbar lordosis as well as shortening of the iliopsoas muscle is an easily obtainable way of "resting" the disc (73, 74).

Different flexion and extension exercises have been recommended (24, 31, 32, 60, 61, 83, 98) in order to increase the mobility of the spine and the strength of abdominal and back muscles. Many of these exercises, however, increase the load of the lumbar spine to such an extent that it reaches magnitudes as high as those measured in standing and leaning forward with weights in the hands (79). There is general agreement that such a position should be avoided by back patients!

With regard to the disc pressure isometrically performed exercises seem less dangerous (79). Two different controlled studies have also demonstrated that such exercises alone or in combination with traction gave better clinical results than ordinary flexion and extension programs (57, 58, 102).

The intradiscal pressure has been shown to increase both from passive motion and from muscular activity (79). By avoiding the motion some of the pressure increase is also avoided.

It remains to be shown, however, that strong

muscles protect the back from painful episodes (35, 46, 48) and no evidence has been presented that subjects with low back pain possess particularly weak muscles, except when they have been kept off work for a longer period of time (78). On the other hand it is known that in certain situations, i.e. in lifting and carrying heavy objects the increase of intraabdominal and intrathoracic pressure, from contraction of abdominal and costal muscles, will help to relieve some of the load of the lumbar spine (3, 15, 16, 19, 69). It should therefore be regarded as rational to perform isometric abdominal muscle exercise in patients who are in a rehabilitation program after a longer period of low back pain.

Also in these subjects, special reference should be given to the training of the quadriceps muscles, as they take more load when lifting weights the "proper" way than the "wrong" way, as will be described below.

In subjects with a "weak" back, probably the most important task for the physiotherapist is to give ergonomical advice i.e. to carefully instruct the patients to avoid certain movements and postures in his daily life that we know increase the load more than others (1, 4, 17, 20, 30, 60, 75, 77, 79, 98). From that point of view straight standing is better than unsupported sitting (77, 99). In sitting the back should have a good support and the hip and knee-joints kept well flexed. Forward bending should be avoided as much as possible and especially for longer periods of time. When lifting weights great advantage, from a mechanical point of view, is obtained by teaching the patient to avoid flexion of the back (79). He should be instructed to flex the knees and keep the spine as straight as possible, so when lifting make use of the knee extensors. The difference in load on the third lumbar disc between lifting 20 kg the "right" way versus the "wrong" way has been measured at about 125 kg in individuals of slim build and is certainly even more in heavier people (79).

Movements like walking, twisting and sideways bending some 20° to 30° are less pressure inducing than coughing, straining and jumping (79). From a clinical point of view the former movements have also been said to be of minor importance in producing pain in back patients (1), while the latter maneuvers are known often to exaggerate the symptoms (1, 46, 48, 49). Compared to the

pressure in standing the increase noted in the first group of movements averages 20%, in the second 45%, corresponding to load increases of about 20 kg and 40 kg, respectively (79).

In the rehabilitation of patients with back problems the particular working situation and position thus should be carefully considered and proper arrangements made for changes that with our present knowledge lessen the mechanical stresses on the lumbar spine.

The effect of traction, either alone or in combination with different exercises has been discussed (13, 53, 54, 62, 67, 92, 99, 100, 102). From a mechanical point of view, evidence exists that traction applied on a sliding table with about 50% of the body weight, will decrease the intradiscal pressure by 25% (79). On the other hand injuries from prolonged stretching of the lumbar spine have also been reported (101). If applied a few times with care its use can probably be justified.

There exist throughout the world a number of "manipulation schools", who by different methods of applying twisting, stretching and bending forces to the lumbar spine, claim excellent results (8, 13, 66). The unproven theory behind most of these maneuvers is that a "locked" and painful segment should be loosened. The diagnosis of this decreased segmental mobility is made by careful palpation through more or less thick layers of soft tissues.

Before being seriously considered as an important adjunct in the treatment of low back pain it must be regarded fair to ask from the advocates of the method to objectively demonstrate (a) what they are feeling (b) if what they are feeling has any importance to the symptoms of the patient, (c) if the manipulation has the wanted effect and finally and most important (d) if the clinical effect of the method is superior to other forms and also for which particular patients. Since controlled evidence exists about the subjectivity of the palpation technique (97), of the difficulty in relating pain to disc degeneration (and mobility) (44, 45, 52, 56) and also about the doubtful clinical effect of the procedure (29, 30, 32) it is perhaps conceivable that most clinicians have a critical attitude.

Thus while awaiting further knowledge of the back problem it is fairest to our patients and ourselves to prescribe simple and inexpensive methods of treatment, where the known mechanical

factors can guide our advice. In that respect special attention should be given to ergonomics both at home and at work, both by the physician and the physiotherapist.

Exercises, which should be performed isometrically, are probably more important for abdominal and quadriceps muscles, than for back muscles. Even if the etiology of most cases of low back pain is unknown it should be fair to ask for objectivity in treatment, e.g. we should all try to evaluate our "belief" in a statistically sound manner.

In a combined objective effort by biochemists, pathologists, biomechanists, orthopaedic surgeons and physiotherapists as well as others interested, it is likely that the etiological as well as therapeutic problems of low back pain may be solved in the relatively near future.

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