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Adaptation of Tilt Table for Lumbar Traction

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The use of cervical traction for alleviation of some cervical syndromes, particularly those with nerve root compression, has been established clinically as efficacious. Currently, cervical traction is used as a standard procedure in physical medicine clinics throughout the country. The chief reason for its popularity is, undoubtedly, the resulting subjective and objective benefit to the patient. Other factors which increase its popularity are the ease of its application and the low cost of the equipment required.

Lumbar traction, on the other hand, has not met with such wide popularity and has not proved as successful in the treatment of low back syndromes. There has been greater difficulty in localizing traction to the lumbosacral spine.

Review of the literature reveals essentially three methods used by physicians for administering lumbar traction. Probably the oldest yet still the most utilized method is Buck's traction which is applied with adhesive tape to the legs of the patient in bed. According to the work of Judovich,¹ the therapeutic effect of this traction on the lumbar spine is negligible since a force of about 26 per cent of the total body weight is required in order to overcome friction.

Vargo² described another method of applying lumbar traction. By using a pelvic band on the patient in the supine position, the pelvis received the traction by means of two straps, connected to the pelvic band, which are led at the lateral sides of the legs to a spreader bar, pulley and the weights. Weights from 5 to 20 pounds up to approximately 40 pounds

are used over the foot of the bed or treatment table. This method, of course, may be used either by continuous horizontal traction, for specific period of time, or it may be used intermittently by what is called "intermittent lumbar traction," in which the motorized controlled force gradually is built up and released. This method of horizontal pelvic traction is an improvement over Buck's traction but its disadvantage is that the amount of force which is applied to the lumbosacral spine is limited. If heavy force is exerted on the pelvic band or on the pelvic girdle by weights or motor, then the patient is pulled off the edge of the table. If a counterforce on the chest is added, using a girdle which encompasses the abdomen and rib cage, the force exerted on the rib cage and the costovertebral joints can be painful.

Lehmann and Brunner³ described a hydraulic device for administering lumbar traction which delivers traction to the lumbar spine with the patient in a standing position. The patient is fitted into a chest harness which encircles the upper trunk and the upper arms. The harness is attached to a hydraulic lift. The counterforce is a harness or pelvic-girdle type of apparatus which fits over the crest of the ilium and is connected to the framework of the traction machine by straps. This apparatus can be modified so the patient can sit on a chair

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instead of standing. This procedure and technic does produce, according to Lehmann and Brunner, significant separation of L 4-L 5 and L 5-S 1 intervertebral interspaces, and also stretching of the lumbar muscles. The method is, however, cumbersome and uncomfortable, and may be a hazard particularly to obese patients causing them to feel faint. Also, the patient under treatment may develop respiratory difficulty.

The author has used all of these lumbar traction technics for the treatment of lumbar nerve root conditions with only equivocal results. It was only reasonable, therefore, to continue to search for a method of applying lumbar traction that is more effective, efficient and convenient. With this in mind, the apparatus described below was constructed and the method of treatment was developed and refined.

Apparatus

The therapeutic traction table is motorized and is operated by a control switch which can place it at any angle from a horizontal to a completely vertical position. The most useful aspects of the apparatus are as follows: The pelvic harness surrounds the pelvis of the patient and is adjustable by means of straps, buckles, and lacing to fit the individual patient. The adjustable triangular structure is for the support of the patient's knees to allow him to be placed in a position more advantageous for traction. The sliding area at the end of the table is movable so it can be adjusted to the height of the patient. There are approximately 10 punch holes in the vertical brackets (which hold the cables) at the end of the sliding area; these control the angle of the pull as directed through the cables. "Windows" are cut from the triangular part of the apparatus through which the cables pass to make certain that the force is linear and direct. Figure 1 shows the position of the patient under treatment at an angle of approximately 60 degrees. The top of the table is highly polished to eliminate friction. The patient, under traction at a practically complete vertical angle, is free from any

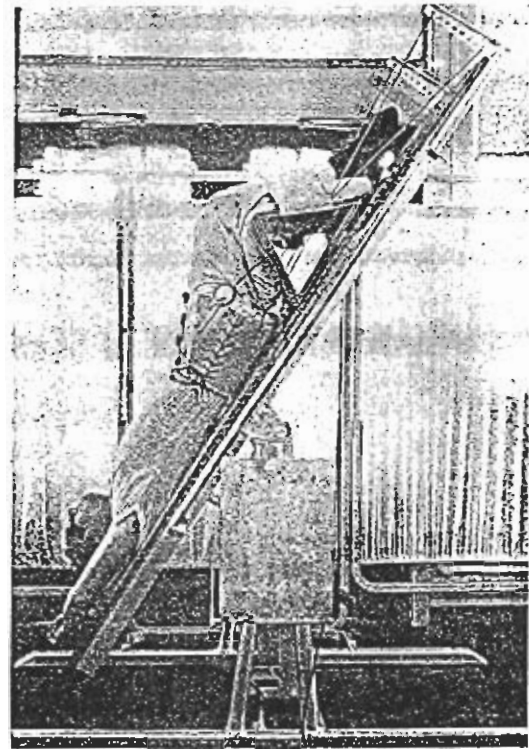


Fig. 1 — Patient receiving lumbar traction at 60 degree angle from horizontal.

friction as the upper part of the body (over 50 per cent of the body weight) is the main source of traction on the lumbar spine. Additional weight can be added by the physician or therapist by exerting a downward pull on the upper trunk. The patient in this position can be manipulated by the physician with considerable ease. Figure 2 demonstrates the versatility of the traction table. By use of a foot board inserted into one end of the table at a right angle to the table, a conventional standing-tilt table is available.

Preliminary Clinical Study

A preliminary clinical investigation was conducted from 1957 through 1963 to try to ascertain the therapeutic efficacy of such a lumbar traction procedure. Table 1 gives a brief outline of the diagnoses and results of treatment.

The term "improved," as used in the table, means that the patient recovered and returned to full time work. In some cases the symptomatology did recur which necessitated another series of treatments with traction. The average num-

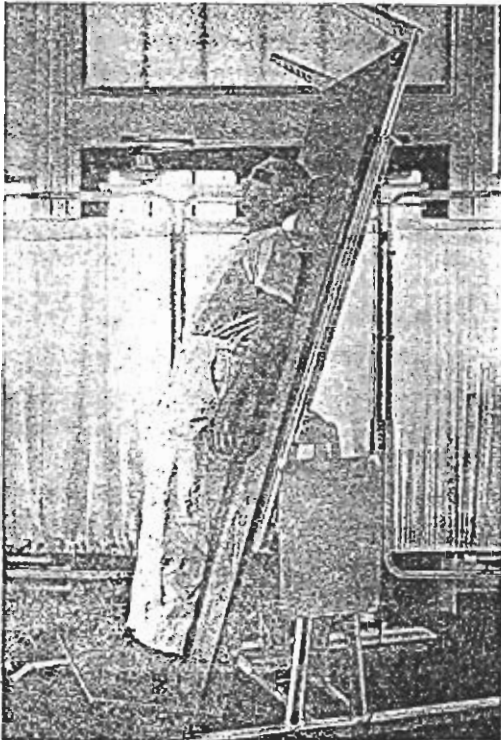


Fig. 2 — Traction table adapted for use as a tilt table.

ber of treatments per patient was eight. The degree of vertical suspension of the patient was determined first by the patient's tolerance to the traction and position and second by the severity of the symptomatology. In general patients were able to tolerate the 60-degree position up to five minutes. In the completely vertical position, patients tolerated traction from two to four minutes. As a precaution, the blood pressure of the first 100 patients treated by this method was taken before, during and after treatment. In the entire series no significant alteration of blood pressure or pulse was noted. Traction in general was tolerated well and after the second treatment pa-

tients generally had no difficulty when placed in a vertical position. Patients who had a history of hypertension or chronic headache were not treated by this method because these conditions are considered contraindications to such treatment.

Discussion

By making use of gravity for providing lumbar traction through suspension of the body, there are evident certain advantages over other methods. These are:

1—A maximum amount of traction can be administered for short periods of time, a concept which in cervical traction has proven most effective.

2—The ease of operation, because no cranks, weights or complicated pulley systems are necessary.

3—The relative comfort to the patient unless the traction is prolonged.

4—The direction of traction can be altered by changing the position of the cable attachments into the right angle uprights.

5—The flattening of the lumbar spine is helped by the triangular knee and leg support.

6—It is possible to vary the degree of inclination of the motor-driven apparatus.

7—The table can be used also for a standing tilt table by attaching a foot board at a right angle at one end.

From the results obtained in the preliminary investigation of 175 patients, some conclusions may be drawn. Encouraging results were obtained in the treatment of low back conditions associated with sciatica. The most encouraging results, however, were those obtained by the treatment of patients suffering

Table 1: Diagnosis and Results of Treatment by New Lumbar Traction Procedure

Diagnosis	Number of Patients	Improved	Unimproved
Observation for herniated disk	85	76	9
Herniated nucleus pulposus	66	57	9
Spondylolisthesis	10	10	0
Lumbar osteoarthritis with sciatica	10	10	0
Coccygodynia	4	2	2
Total	175	155	20

from osteoarthritis with nerve-root involvement. All 10 of these patients received dramatic relief of symptoms after treatment by traction. Of the 133 proved and suspected cases of herniated nucleus pulposus, 88 per cent were improved and 12 per cent were not improved, and many of the patients who did not benefit by the traction required surgery. An especially significant aspect of this type of traction therapy was the fact that the average number of treatments per patient was only eight; treatment was usually given once or twice daily depending on whether the patient was hospitalized or was an outpatient.

In speculating on the therapeutic success obtained with this method of treatment, it is felt that the main basis for improvement was because of the stretching of the paraspinal vertebral muscles and ligaments and possibly the widening of the intervertebral disks.

There were no medical side effects exhibited by the 175 patients in this series or by the additional 100 patients who were treated in the preliminary investigation. However, patients with a history of chronic headache, previous stroke and severe cerebral vascular disease with hypertension, were screened and did not receive traction. These medical conditions are considered contraindications to

this procedure due to the up-side-down position. Age itself is no contraindication; several patients over 65 were treated with no side effects. The author wishes to urge that any use of this method of treatment be under the close supervision of a physician because the correct diagnosis, evaluation and past medical history is required.

Summary

A mechanical device which utilizes the element of gravity in suspending the body to produce lumbar traction has been described. A preliminary study of 175 patients with low back symptoms has been presented. Results, especially in the treatment of nerve-root lumbar conditions, are encouraging and further studies are being conducted.

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