

# 90/90 Traction for Lumbar Disc Herniation

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## ABSTRACT

A series of 30 patients with typical lumbar disc herniation were managed with conservative treatment in which 90/90 traction was used for 15 to 20 minutes daily. Following this therapy, 26 patients reported improvement, while four patients reported uncertain impressions. Traction therapy was found to be valuable for use in the management of disc herniation to reduce intradiscal pressure and decrease paravertebral muscle spasm in order to relieve nerve root inflammation.

## INTRODUCTION

Lumbar disc herniation is a commonly occurring disease in mankind that may produce intractable low back pain and lumbar nerve root insufficiency. Although patients with lumbar disc herniation often demonstrate improvement following adequate therapy, others continue to experience an unsatisfactory result even after treatment with various medical modalities. Operative therapy has not been fully accepted as an ideal method of management of lumbar disc herniation.

In this study, a 90/90 traction device developed

by Cottrell<sup>1</sup> was used as a conservative method of treatment of lumbar disc herniation. The efficiency of the use of this traction method for the treatment of patients with so-called lumbago was reported by Vanharanta et al at the annual meeting of the International Society for the Study of the Lumbar Spine (ISSLS) in 1986.<sup>2</sup>

## MATERIALS AND METHODS

The 30 patients with lumbar disc herniation included 18 males and 12 females who ranged in age from 15 to 48 years (mean: 30.1 years — Table I). The duration of symptoms before traction therapy ranged from one day to three months (mean: 21.2 days — Table II).

The patients selected for treatment with this

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**TABLE I**  
**CLINICAL MATERIAL**

Number of male patients	18
Number of female patients	12
Age range	15-48 yrs.
Average age	30.1 yrs.

**TABLE II**  
**DURATION OF SYMPTOMS**

Duration	Number of Patients
0-7 days	8
7 days - 2 weeks	7
2 - 4 weeks	3
1 - 3 months	6
More than 3 months	6
Mean duration: 21.2 days	

**TABLE III**  
**CLINICAL EVALUATION BEFORE TREATMENT USING JAPANESE ORTHOPAEDIC ASSOCIATION (JOA) SCORE**

Symptoms (Total possible = 9)		Signs (Total possible = 6)		Activity of Daily Living (Total possible = 14)	
Points	Number	Points	Number	Points	Number
0 - 3	10	0 - 2	9	0 - 5	10
4 - 6	17	3 - 4	18	6 - 10	15
7 - 9	3	4 - 6	3	11 - 14	5

Total Scores:  
Range: 2 - 23  
Average: 12.3

traction method demonstrated typical symptoms and signs of lumbar disc herniation: lumbago, lower leg pain, lower leg numbness, muscle weakness of the toe extensors, positive straight leg raising (SLR) test.

The Japanese Orthopaedic Association (JOA) score was used to evaluate the patients before and after traction therapy. Prior to this system, evaluation was essentially based on a general impression. With the JOA system, the patient's recovery

can be evaluated on a more systematic basis, scoring such factors as symptoms, signs, activity of daily living, and bladder function. The total possible score is 29 points, which represents a normal or near normal condition. A low score (10 or less) indicates minimal or poor recovery.

Symptoms evaluated include lumbago, numbness, and gait, with each assigned a value of three points. Signs assessed include SLR, sensation, and muscle power, and each is assigned a value of two points. Activities of daily living that are evaluated include position change, standing, face washing, holding a semiflexed position, sitting more than one hour, lifting a heavy object, and gait, and each is valued at two points. Bladder dysfunction is assessed at a value of minus nine points.

The JOA scores ranged from two to 23 points (mean:  $12.3 \pm 5.0$ ) before traction. Prior to treatment with traction, the score for the majority of patients was six points or less for symptoms, four points or less for signs, and ten points or less for activity of daily living (Table III). No patient complained of bladder dysfunction.

The 90/90 traction device was applied daily for a period of 15 minutes. Duration of treatment ranged from seven to 90 days (mean  $21.8 \pm 4.0$  days). Other conservative treatment methods (e.g., analgesics, heat therapy) were not used for the patients in this series.

## TRACTION DEVICE

The 90/90 traction device consists of four main parts (Fig. 1): (1) A small table used to keep the patient's legs in a position of  $90^\circ$  of flexion at both the knees and hips. The height of the table is adjustable according to the length of the patient's thighs. (2) A pelvic belt that has a small ring in the center to which a traction rope can be connected. (3) A crossbar between the triangular frames. (4) A wedge that supports the patient's back in a slightly flexed position.

To use the traction device, the patient lies down in a supine position on the wedge and pulls downward on the rope handle. The rope is locked so that the patient's buttocks are slightly lifted up. The patients in this series were asked to maintain this position for 15 to 20 minutes each day until the

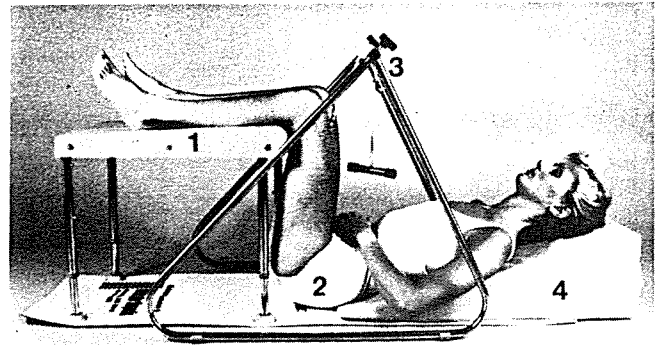


Fig. 1 90/90 traction system: (1) adjustable table, (2) pelvic belt, (3) triangular frame with locking pulley on crossbar, (4) back support wedge.

symptoms dissipated.

Traction forces between the pelvic hook and the extension rope were measured using a strain gauge. These measurements indicated that the forces were distributed from approximately 10-15kg in each subject.

## MRI Evaluation

Magnetic resonance imaging was used to examine 15 patients in this series before and after traction therapy. Prior to traction therapy, marked bulgings at the L4/L5 or L5/S1 level were shown in 12 patients, and in three patients there was a prolapsed herniation at the L4/L5 or L5/S1 level. In some cases, the final MRI examination demonstrated considerable changes in the shape of the disc space following traction. In approximately 50% of the cases, MRI demonstrated no changes in the disc.

## RESULTS

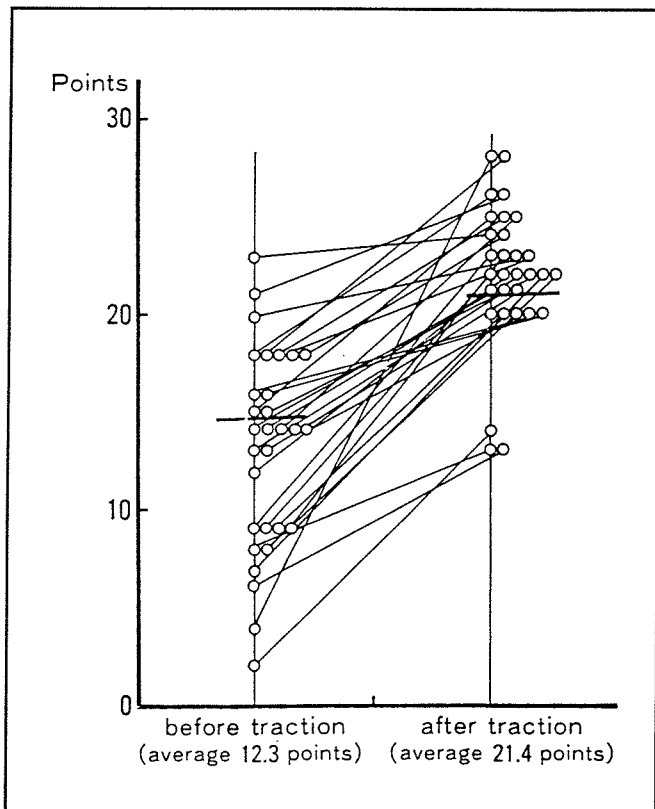
All patients showed improvement following traction therapy. The JOA scores following therapy ranged from 12 to 28 points (mean:  $21.4 \pm 4.2$ ). Furthermore, an improvement pattern was demonstrated in all three categories of the scoring system. There was striking improvement in the SLR sign, with sensation and muscle power showing somewhat less improvement (Table IV).

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**TABLE IV**  
**CHANGES IN SEVERITY OF SIGNS**  
**FOLLOWING TRACTION (n = 30)**

	Before Traction			After Traction		
	Normal (2 points)	Moderate (1 point)	Severe (0 point)	Normal (2 points)	Moderate (1 point)	Severe (0 point)
	<u>Number of Patients</u>			<u>Number of Patients</u>		
SLR	8	18	4	23 (+15)	7 (+4)	0
Sensation	3	17	10	5 (+2)	24 (+9)	1
Muscle power	3	18	9	6 (+3)	23 (+8)	1

\*Figure in parentheses indicates number of patients whose JOA score showed improvement following treatment



**Fig. 2** The JOA scores before and after treatment.

**TABLE V**  
**PATIENT ASSESSMENT OF**  
**TRACTION TREATMENT**

Category	Number
Very good	7 (23.3%)
Good	10 (33.3%)
Good when in traction	9 (30.0%)
Not certain	4 (13.3%)

Among the ten cases in which the score was less than ten points, seven showed good results and three showed fair results, i.e., less than 15 points on the JOA score (Fig. 2).

Among the 30 patients, 26 reported satisfaction with the 90/90 traction therapy (Table V). The remaining four patients reported an uncertain impression regarding the results with this treatment.



Fig. 3 MRI before (left) and after (right) 90/90 traction. Before traction, disc herniation is distinct at the level of L5/S1 (arrow). After traction, the disc herniation is not sharply demonstrated (arrow).

## CASE REPORT

A 24-year-old male medical student presented at the Nagoya City University Hospital in October 1986 with severe low back pain. One week earlier, the patient had experienced severe pain in his lower back as he was getting up out of a chair and had continued to suffer from low back and leg pain since that time.

Upon examination, the range of motion (ROM) of the lumbar spine was limited. There was a positive SLR sign on the right side of approximately 30°. Sensation was impaired on the right lower extremity from the lateral aspect of the leg to the lateral side of the foot, with muscle weakness present in the foot. The JOA score was four points. MRI showed disc herniation at the level of L5/S1 (Fig. 3).

Operative management was determined to be the treatment of first choice. However, since the patient was busy with his medical training, the decision was made to pursue a course of conservative treatment with 90/90 traction therapy. The traction was carried out for 15 minutes daily for 90 days. The symptoms gradually improved, and four weeks after the initial treatment the low back pain had disappeared. At the final consultation, the JOA score was 26 points (Table VI), and MRI showed a change in the appearance of the disc herniation (Fig. 3).

TABLE VI  
CLINICAL EVALUATION  
OF 24-YEAR-OLD MALE  
(JOA SCORE)

	Before Traction	After Traction
Symptom	2	8
Sign	2	6
ADL	0	12
Total points	4	26

## DISCUSSION

Previous reports in the literature have described the value of traction therapy for the management of lumbar disc herniation.<sup>1-4</sup> According to Burton,<sup>3</sup> traction therapy reduces intradiscal pressure and decreases spasms of the paravertebral muscles, thus relieving nerve root inflammation. Telepik and Haskin<sup>4</sup> reported the spontaneous resolution of lumbar disc herniations on final CT examinations following lumbar traction and surmised that this therapy may play an important role in the reduction of disc herniations.

Nachemson<sup>5</sup> measured the pressure of the lumbar spine in various postures and showed that intradiscal pressure is relatively high when the hips are in extension while the patient is lying in a prone position. Conversely, the intradiscal pressure is minimal when the hips are flexed while the patient is in a supine position. The lumbar spine extension exercises described by McKenzie<sup>6</sup> may have an adverse effect on attempts to reduce intradiscal pressure.<sup>7</sup>

Based on the work of Nachemson, Kirita proposed that pelvic extension in a semi-Fowler position with the legs in extension could have a beneficial effect on reducing intradiscal pressure

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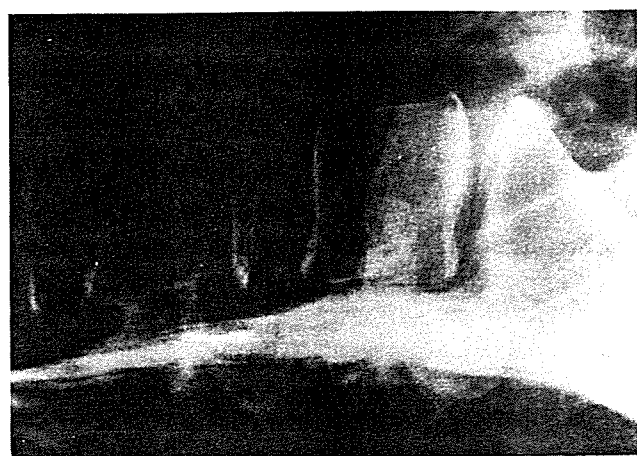


Fig. 4 Myelograms of 40-year-old female patient in supine position (above) and in supine position with hips and knees in 90° of flexion (below).

[Kirita Y: Personal communication, 1985.]. With the 90/90 traction device used in this study, the patient lies in a supine position with the hips and knees in 90° flexion.

To investigate the influence of the 90° flexion position on intradiscal pressure, myelography was performed on a patient with lumbar disc herniation while in a supine position and also while in a supine position with the hips and knees flexed 90° (Fig. 4). As illustrated in Fig. 5, the anteroposterior margin of the disc space showed little enlargement. The results of this investigation indicate that even slight changes in the disc space may play an important role in the reduction of intradiscal pressure.

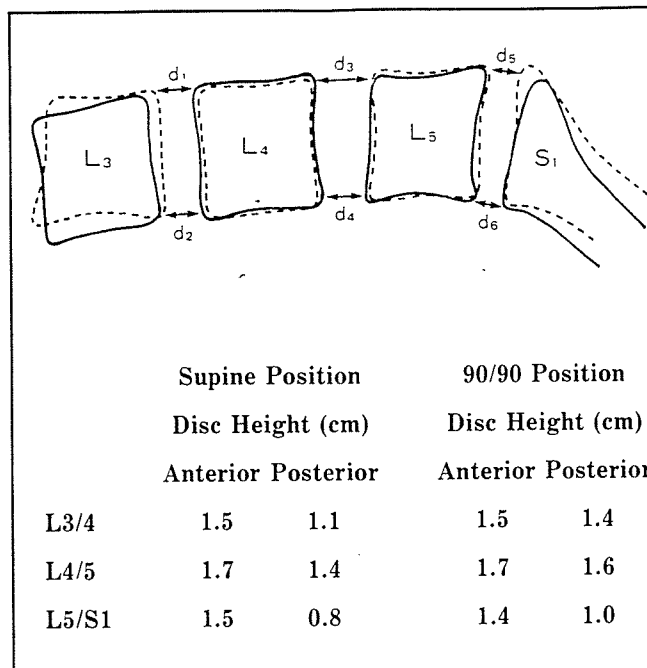


Fig. 5 Schematic drawing of the effect of positional changes on disc height in patient shown in Fig. 4.

## CONCLUSION

A 90/90 traction device that is used with the patient lying in a supine position with the hips and knees flexed 90° was found to be an effective method of conservative treatment in a series of 30 patients with lumbar disc herniation. The 90° flexion position appears to result in slight changes in the shape of the disc space, reducing intradiscal pressure and decreasing spasm of the paravertebral muscles, thus relieving nerve root inflammation.

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