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To compare the effect of Active Neural Mobilization during Intermittent Lumbar Traction and Intermittent Lumbar Traction followed by Active Neural Mobilization in cases of Lumbar Radiculopathy

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ABSTRACT

To compare the effectiveness of Active neural mobilization (ANM) during intermittent lumbar traction (ILT) and intermittent lumbar traction followed by active neural mobilization treatment in patients of low back pain (LBP) with radiculopathy.. To study the effect of ANM during ILT and ILT followed by ANM in patients of LBP with radiculopathy on VAS scale, P1 angle of SLR, P2 angle of SLR and Oswestry disability index(ODI). To compare the effect of ANM during ILT and ILT followed by ANM in patients of LBP with radiculopathy on visual analog scale (VAS) scale, P1 angle of SLR, P2 angle of SLR and Oswestry disability index. In this study 107 patients of LBP with radiculopathy were randomly assigned into two different groups. Group A containing 54 patients received active neural mobilization during intermittent lumber traction and group B received intermittent lumber traction followed by active neural mobilization. The data on all the outcome measures were recorded on day 0 pre-treatment and on 10th day post treatment. Data were analyzed using statistical software Intercorted STATA VERSION 9.0. Patients in both the groups showed improvement in all 4 outcome measures as compared to baseline assessment values. Patients treated in group A showed more improvement as compared to group B. This study concluded that ANM during ILT gives more relief and yields better responses in patients of LBP with radiculopathy and may help person to resume his daily activities.

Key words: Active neural mobilization, intermittent lumber traction, Low Back Pain with Radiculopathy.

INTRODUCTION

As we are progressing in to the 21st century life has become more sedentary and computerized rather than mechanical, giving rise to less bodywork and more sitting jobs. Subsequently this sedentary life style leads to reduction in general mobility and resultant musculoskeletal disorders such as neck pain and low back pain. Low back pain is one of the great human afflictions. This low back pain may or may not be associated with radiculopathy. The low back pain with radiculopathy is mainly referred to the pain originating from the irritation of the sciatic nerve root i.e. L4, L5, S1, nerve root known as sciatica. Here the pain from the back radiates down to one or both legs mainly below the knee up to the foot. There are various causes of low back pain with radiculopathy like PID, degenerative disc disease, Lumbar canal stenosis etc. [14]

Estimate show that 60% to 80% of adults experience low back pain at some point in their lives. Whereas the prevalence of lumbosacral radiculupathy is quite low. [1] Approaches to spine rehabilitation of patient having LBP with raliculopathy have changed greatly over the years. The use of traction to unload the spinal structures, which are causing compression of the nerve root in lumber radiculopathy, is practice since very long duration.[4]

The recent being the concern for what Maitland called "Movement of pain sensitive structures within the vertebral canal," and is termed as "The mobilization of nervous system". [2]

The use of neural mobilization of lower limb i.e. SLR with dorsiflexion of ankle to mobilize the lower limb nervous system is the recent treatment of choice in lumbar radiculopathy but data to support the use of this technique is lacking. This technique is described by Butler but he did not base his suggestion on research or clinical trials. I have tried to search for research material to study the efficacy of this technique in low back pain with radiculopathy, but could not find the relevant documents. I came across

a fact that in spite of properly described technique, no attempt was made to utilize this technique for the management of low back pain with radiculopathy. This may be my shortcoming to search but also this has stimulated me to conduct the study.

Thus we thought of combining two treatment techniques i.e. traction and neural mobilization to mobilize the lower limb nervous system during lumbar traction when the spine is unloaded in reducing low back pain, improving P1 (i.e. angle where pain starts) and P2 (i.e. angle where pain becomes intolerable) angle of SLR and improving functional ability of patients.

MATERIALS AND METHODS

This comparative study was conducted during the period April 2015 to March 2016 in Dr Ulhas Patil College of Physiotherapy, Jalgaon. The study included 107 patients with symptoms of low back pain with radiculopathy in one or both limb who were referred from the department of orthopedics.

Inclusive criterion:

1. Patient having lumbar spondylosis with radiculitis in one or both lower limb.
2. Patients having prolaps intervertebral disc with radiculitis in one or both lower limb
3. Patient having positive SLR test.
4. Patient having L4, L5, S1, S2 nerve root involvement

Exclusion criterion

1. Patient with history of direct trauma, fracture, Dislocation of spine.
2. Patient with neurological deficit.
3. Patients with severe hamstring tightness
4. Patient with T. B. of spine.

The patients willing to participate in the study were explained about the procedure. A written consent was taken from all of them. They were randomly divided into two groups i.e. group A and group B.

Outcome measures:

After assessing the patient following outcome measures were recorded.

1. Pain on VAS
2. P1 Angle of SLR **(13)**
3. P2 Angle of SLR **(13)**
4. Oswestry disability Index.

The outcome measures were recorded on 1st day pretreatment thereafter-10th day post treatment, 1st wk post treatment, 2nd wk post treatment and 3rd wk post treatment.

Group A:

In this group total of 54 patients having low back pain with radiculopathy were included.

Patient was treated with active neural mobilization during intermittent lumber traction followed by conventional treatment.

In this group patient received intermittent lumber traction for 20 minutes with a hold time of ten seconds and relaxation time of 10 second. The weight applied during the traction was approximately half of the body weight of

the patient depending upon the tolerance. The patients were asked to perform active neural mobilization (with ankle dorsiflexion, knee extension and hip flexion) during traction Phase till the angle of P1.

The limb was brought down during phase of relaxation for a period of ten second. The patient was asked to take rest of one full phase of traction and relaxation after every two repetitions.

Group B:
In this group total of 53 patients having low back pain with radiculopathy were included.

Treatment given is intermittent lumber traction as above followed by active neural mobilization and some conventional physiotherapy treatment.

The treatment was given initially for 10 days continuously thereafter the treatment was given on alternate days for 1 wk, then 2 times a week and lastly once a week. The total duration of treatment was 16 days spread in 4 weeks. Pulsed Short wave Diathermy (SWD) was given to all patients of group A and B for 10 min for 7 days using coplanar method along with some conventional exercises like static upper back exercises, Back Extension Exercise, Pelvic bridging **,**Static Abdominal Exercises, Knee on chest, Spinal Rotation Exercise , Advice to the patient (BACK CARE)

RESULTS

Pain, P_1 and P_2 angle of SLR and functional abilities are presented as mean ± SD. Mean changes in pain, P_1 and P_2 angle of SLR and functional abilities are compared at different time interval i.e at the end of 10^{th} day, 1^{st} week, 2^{nd} week & 3^{rd} week from baseline (1^{st} day) by using unpaired 't' test. Categorical variables (sex distribution, Age distribution, diagnosis distribution and duration of symptoms) are expressed in percentage. Categorical data is analyzed by Pearson chi2 test. The results are tabulated in terms of mean, standard deviation and mean change. 'P' values less than 0.05 is taken as statistically significant and less than 0.001 is taken as highly significant. Data were analyzed on statistical software Intercorted STATA VERSION 9.0.

The mean age for group A is 45.96 and group B is 46.11. In group A there were 28 males and 26 females and group B 26 males and 27 females.

Table No. 1 Mean score of pain on VAS at different time internal from the base line

Time internal	Group A	Group C
Day 1	7.09 ± 1.16	7.38 ± 1.00
10^{th} day	4.34 ± 0.83	5.16 ± 0.80
1^{st} wk	2.51 ± 0.59	3.75 ± 0.69
2^{nd} wk	1.29 ± 0.45	2.92 ± 0.56
3^{rd} wk.	0.50 ± 0.38	2.39 ± 0.54

Table No. 2 Mean changes of pain on VAS at different time internal from the base line

Time internal	Group A	Group C	P value
10^{th} day	2.75 ± 0.64	2.20 ± 0.43	0.0000 HS
1^{st} wk	4.58 ± 0.81	3.62 ± 0.64	0.0000 HS
2^{nd} wk	5.79 ± 0.96	4.42 ± 0.71	0.0000 HS
3^{rd} wk.	6.59 ± 1.00	4.98 ± 0.75	0.0000 HS

The decrease in pain is highly significant in Group A as compared to Group C.

Table No. 3 Mean score of P1 Angle of SLR at different time internal from the base line

Time internal	Group A	Group C
Day 1	42.88 ± 7.27	40.34 ± 6.79
10^{th} day	54.85 ± 5.81	49.11 ± 6.27
1^{st} wk	62.65 ± 4.48	55.52 ± 5.69
2^{nd} wk	67.72 ± 3.53	60.34 ± 5.23
3^{rd} wk.	70.32 ± 2.19	63.97 ± 4.75

Table No. 4 Mean changes in P1 Angle of SLR at different time internal from the base line

Time internal	Group A	Group C	P value
10th day	11.97 ± 2.38	8.77 ± 1.47	0.0000 HS
1st wk	19.77 ± 4.00	15.18 ± 2.45	0.0000 HS
2nd wk	25.21 ± 4.59	20.00 ± 3.19	0.0000 HS
3rd wk.	30.66 ± 4.44	23.62 ± 3.76	0.0000 HS

The increase in P1 angle of SLR is highly significant in Group A as compared to Group C.

Table No. 5 Mean score of P2 Angle of SLR at different time internal from the base line

Time internal	Group A	Group C
Day 1	50.88 ± 6.31	47.70 ± 5.82
10th day	61.09 ± 5.05	55.54 ± 5.56
1st wk	67.61 ± 3.78	60.67 ± 5.22
2nd wk	70.21 ± 1.83	64.60 ± 4.82
3rd wk.	70.00 ± 0.00	66.85 ± 3.53

Table No. 6 Mean Changes in P2 Angle of SLR at different time internal from the base line

Time internal	Group A	Group C	P value
10th day	10.28 ± 2.85	7.83 ± 1.99	0.0000 HS
1st wk	17.15 ± 3.64	12.96 ± 2.43	0.0000 HS
2nd wk	22.69 ± 3.92	16.90 ± 3.06	0.0000 HS
3rd wk.	29.66 ± 4.04	20.33 ± 3.49	0.0000 HS

The increase in P2 angle of SLR is highly significant in Group A as compared to Group C.

Table No. 7 Mean score of ODI at different time internal from the base line

Time internal	Group A	Group C
Day 1	361.13 ± 49.89	363.66 ± 45.43
10th day	255.22 ± 49.13	289.68 ± 28.11
1st wk	185.20 ± 24.69	246.00 ± 22.09
2nd wk	146.54 ± 16.85	214.39 ± 17.18
3rd wk.	118.28 ± 13.31	191.15 ± 16.58

Table No. 8 Mean changes in ODI at different time internal from the base line

Time internal	Group A	Group C	P value
10th day	105.90 ± 41.50	73.98 ± 21.91	0.0000 HS
1st wk	175.92 ± 31.51	117.66 ± 28.93	0.0000 HS
2nd wk	214.59 ± 41.15	149.26 ± 32.82	0.0000 HS
3rd wk.	242.85 ± 42.98	172.50 ± 35.11	0.0000 HS

The improvement in ODI is highly significant in group A as compared to Group C.

DISCUSSION

In present study the total of 107 patients having low back pain with radiculopathy were randomly divided into Group A and Group B. It is observed that low back pain with radiculopathy is common between 40-50 years of age group i.e. in the middle age **[8].** It is observed that the males and females are equally affected by the problem **[11].** The duration of pain was approximately up to 4 months.

The stastical analysis of present study shows improvement in outcome measures i.e. pain on VAS, P_1 and P_2 angle of SLR and functional Index in group A and Group B.

Highly significant results in terms of overall pain reduction on VAS, increased P_1 and P_2 angle of SLR and improved functional activity in the group given active neural mobilization during ILT possibly be due to a combined effect of traction and neural mobilization.

The ILT leads to mechanical stretching of tight tissue, which increases the mobility of the affected segment. It also leads to stimulation of mechanoreceptor [5] which blocks the transmission of nociceptive stimuli at the spinal cord or brain stem level and inhibition of reflex muscle guarding will decreases the discomfort from the contracting muscle. All these effects may decrease the overall pain from restricted movement or strain on tight tissues.

The ILT cause unloading of the content of IVF i.e. nerve root, dorsal root ganglion, spinal nerve, intra-foraminal blood vessels, sinuvertebral nerve [4]. ILT also causes movement of the affected region which assists in circulation and may help in reducing stenosis from circulatory congestion, thus relieves pressure on dura, blood vessels and nerve root in inter vertebral foramina. The traction causes normalization of interfacing tissues thus helps to restore axoplasmic flow [6]. Traction leads to reduction of disc protrusion by positive decompression, drawing the protrusion towards the center thus the pressure on the contents of inter-vertebral foramina gets released [6].

All the above factors help in free movement of the nervous system during active neural mobilization. Thus when neural tissues moves freely there are normalization of pressure gradient around the nervous tissues and thus normalize the blood supply to the affected nerve. Improved blood supply brings nutrition and removes inflammatory waste products, which allows the restoration of the homeostatic function of the DRG.

Movement of nervous tissue also stimulates neuronotrophic proteins, which is necessary for active regeneration and neurite elongation.

While performing active neural mobilization there is considerable caudal moment of lumbar and sacral roots in relation to interfacing tissues such as intervertebral foramina and traction opens these intervertebral foramina and freeing the compressed nerve roots and mobilizes the nerve making it free within the sheath.

Whereas comparatively delay pain relief in group B may be due to the reason that patients in this group received neural mobilization after traction was over i.e. when the spine was not that much unloaded as it was during traction. Also patient had to move from traction table to the treatment couch for neural mobilization and this might further reload the spine. So when neural mobilization was given after the intermittent traction was over that means when the nerve roots are not that much tree at the level of IVF. Therefore it taken longer time to make the blood supply of nerve normal and free it from interfacing tissues.

This may explain early pain relief and improvement in P_1 and P_2 angle of SLR during treatment in Group A as compared to Group B.

As the pain reduction was more in group A patients, they also show more improvement in functional abilities as compared to Group B .

It may hence be presumed that actual use of neural mobilization technique so well described is probably not done as no relevant clues could be searched. So the results in this study cant be compared with any other study. This study may itself be considered as pilot study for generating research question and a new hypothesis. A well planned elaborated study based on these finding is recommended to further comment on the success.

CONCLUSION

From the study conducted, it has been observed that active neural mobilization during ILT and ILT followed by active neural mobilization along with conventional physical therapy are effective in treating low back pain with radiculopathy.

However, there is more significant improvement in all the outcome measures when neural mobilization was given during ILT as compared to when neural mobilization was given after ILT.

Therefore, it has been concluded that neural mobilization given during ILT Traction accelerates the rate of recovery and yields better response so that the patients can proceed to their daily activities at the earliest when compared to neural mobilization given after ILT.

Conflict of Interest: None

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Ethical Clearance: Taken from ethical committee of our college.

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