

Effectiveness of High Power LASER Therapy and Ultrasound-Guided Percutaneous Electrical Nerve Stimulation in Patient with Far Lateral Lumbar Disc Herniation: A Case Report

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Abstract— Lumbar far lateral disc herniation is one of the unusual types of lumbar disc herniation and in most cases it must be managed through surgical procedures. In this case report, a nonsurgical treatment for managing this condition has been investigated. This treatment plan consisted of two interventions: high-intensity laser therapy and percutaneous electrical nerve stimulation. The patient was a young adult with a considerable level of physical activity in his lifestyle. The applied protocol had significant results in managing the patient's pain and paraesthesia and improved his health-related quality of life. These data demonstrate that this treatment seems to be effective in managing symptoms of far lateral disc herniation which causes severe acute radiculopathy with active denervation.

Keywords— Conservative treatment; Disc herniation; Far lateral disc herniation; Laser therapy; Low back pain; Physical Therapy; Percutaneous electrical nerve stimulation; Rehabilitation.

I. INTRODUCTION

Far lateral lumbar disc herniations (FLLDH) is a type of disc pathology that is represented by a unique clinical presentation. It can compress the spinal nerve and dorsal root ganglion which leads to severe low back and radicular pain (1, 2). Because of the inherent complicated anatomical path to the lateral interpedicular compartment, the surgical procedure for managing this condition is challenging since there is a risk of nerve damage or injuring the overlying facet joint, which can cause an unstable spine leading to spinal fusion surgery in the future (3). Hence, it is advised to hesitate in surgical procedures and try on conservative therapy for managing FLLDHs. However, based on the previous studies, in most cases, patients responded poorly to the conservative measures and surgical treatment with different degrees of invasiveness is the effective treatment for curing this disease (1,4). The plan of treatment in this report consisted of two interventions: High-intensity laser therapy (HILT) and percutaneous electrical nerve stimulation (PENS). HILT is one of the new interventions that have been used in the therapeutic protocols of pain management. In this treatment, by using powerful beams it is possible to irradiate to penetrate deeper into deeper tissues and bring a high amount of multi-directional energy in a short period of time (5). PENS can be considered effective in pain relief and promoting physical function in patients with long-term LBP (6). Also it is effective in controlling self-reported disability and promoting mood, life control, and physical performance (7). The objective of this report is to investigate the effectiveness of a conservative protocol for managing symptoms of an FLLDH in a patient with 2 years of follow-up.

II. CLINICAL PRESENTATION

A 38-year-old male truck driver was referred to our clinic with a 2-month history of lower back pain & radicular pain to the left lower extremity, that became more severe and associated with slowly progressive paresthesia in the Posterolateral of his left leg. The electromyographic findings revealed moderate to severe acute S1 radiculopathy on the left with active denervation (figure 1, 2). MRI findings revealed left FLLDH (figure 3).

The patient was on bed rest since his pain started and he had taken NSAIDs (naproxen 500mg, celecoxib 200 mg), pregabalin 150mg, and fluoxetine 20 mg. The patient reported no reduction in his symptoms. He reported that his paresthesia worsened 1 week before his first session and it progressed up to his knee level. Also, at the same time, he lost his ability to walk on his own due to the severity of his pain (visual analog scale [VAS] of pain while walking: 9/10, at rest: 7/10). The patient was referred to our clinic by a neurosurgeon with the order of discontinuation of medication and 10 sessions of conservative treatment.

Anti Sensory Left/Right Comparison											
Site	L Lat (ms)	R Lat (ms)	L-R Lat (ms)	L Amp (µV)	R Amp (µV)	L-R Amp (%)	Site1	Site2	L Vel (m/s)	R Vel (m/s)	L-R Vel (m/s)
Sural Anti Sensory (Lat Mall)											
Calf	2.8				52.7		Calf	Lat Mall		50	
Motor Left/Right Comparison											
Site	L Lat (ms)	R Lat (ms)	L-R Lat (ms)	L Amp (mV)	R Amp (mV)	L-R Amp (%)	Site1	Site2	L Vel (m/s)	R Vel (m/s)	L-R Vel (m/s)
Tibial Motor (Abd Hall Brev)											
Ankle	6.9			4.5			Knee	Ankle	40		
Knee	16.7			4.3							

Fig. 1. Nerve conduction studies.

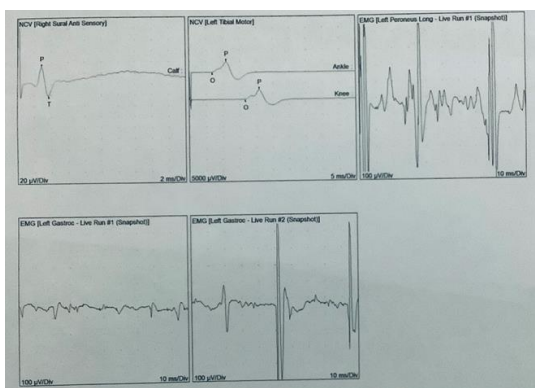


Fig. 2. Electromyographic wave forms.



Fig. 3. MRI (T2 axial sequence): left far lateral disc herniation.

III. INTERVENTION

The patient underwent 10 sessions of physical therapy: the first week, 3 sessions every other day, the second and third weeks two sessions per week, and the other 3 sessions once a week. During the first five sessions, the patient was treated only with a high-intensity laser (5W, 300 Hz, 10 minutes). The patient reported a mild decrease in his level of pain at rest one day after his first session. After five sessions, this reduction of pain continued until the point that the patient was able to walk without assistance for five minutes (VAS: 4/10). However, there was no reduction in the paresthesia until the 5th session, and based on the patient's reports walking makes the paresthesia worse.

From the 6th session percutaneous electrical nerve stimulation was added to the treatment plan. Each session the patient underwent 15 minutes of PENS (100Hz) 4 pairs of needle electrodes (2.5 cm length) in L5 and S1 dermatome in the low back and one pair from S1 dermatome from the low back to the gastrocnemius muscle. All the needle insertions were done under ultrasound guidance (6–15 MHz linear array transducer). Based on patients' reports both pain and paresthesia had a considerable reduction when PENS was added to the treatment plan. The territory of paresthesia moved gradually from posterior of the knee toward the patient's foot. This reduction in paresthesia and pain made the patient able to perform his activities of daily living (ADL) without assistance.

IV. RESULTS

After the 10th session, reassessment showed that the patient's pain was reduced significantly (VAS 1/10 in long and hard activities, 0/10 at rest, and mild to moderate activities), and

the paresthesia was considerably limited and only appear after longer than 30 minutes of activity. The follow-up sessions were after 1, 2, 4, 10, 16, and 24 months. In the first and second follow-up sessions, the treatment was applied but for the rest of them no treatment was necessary because the patient reported no symptoms.

V. DISCUSSION

About 5% to 15% of the low back pain is secondary to lumbar disc herniation and 7-12% of them are considered to be FLLDH (8, 9). FLLDH is one of the unusual kinds of lumbar disc herniation that can be considered hard to be diagnosed and treated. In many cases it had been referred as a failed back pain because it gets misdiagnosed and mistreated (4). Its particular anatomical situation makes it difficult to manage through surgical procedures (3). The irritation that it causes for the nerve root leads to severe and unbearable pain and other symptoms. Previous studies showed that conservative treatments are not effective in managing these symptoms (1). But maybe if we use new conservative interventions and combine them with some of the conventional conservative treatments we could find a new protocol for treating this condition.

HILT can be an effective nonsurgical intervention method for reducing pain and improving the ability to perform ADL (10). It had been proven that HILT could fasten the improvement in lumbar segment motion, angle of straight leg raising (SLR), and overall function in patients with lumbar disc herniation and its effects are long-lasting and can be applied easily in the clinic (11, 12). This painless intervention has notable effects on reducing pain with photomechanical, photothermal, and photochemical mechanisms, and its therapeutic effects, including anti-edema, analgesic, and biological stimulation (13). All of these benefits make this intervention an acceptable option for managing FLLDH. It has been proven that PENS is more effective than other conventional methods of physical therapy in managing the symptoms of low back pain (6). It is a minimally invasive neuromodulation approach for managing musculoskeletal pains (14) and it seems to be a good technique for patients who are not responsive to pharmacological interventions (15).

A factor that must be noted is that the patient was a young adult with an occupation that needs considerable physical activity. based on both physical examination results and MRI and EMG findings surgical procedure was recommended. Because of the severity and type of his condition the probability of failure of conservative treatment was high. But after two years follow up no recurrence of symptoms was observed and the patient was able to perform all of the physical activities that were necessary for his job and life. These data demonstrate that this method seems to be effective in the combination of high-intensity laser therapy weight per katanas electrical nerve stimulation PENS can be effective in managing the symptoms of FLLDH and the effect of this treatment is not short-term.

An interesting outcome that was observed in this patient was how PENS was effective in managing paraesthesia. The patient was treated by laser for five sessions and it was effective in pain reduction however it appears that it did not affect in reduction of paraesthesia. But after using PENS in the mentioned protocol

the patient reported a decrease in the severity and territory of paraesthesia. There are limitations to this report and surely confirming these results need more research and investigation.

VI. CONCLUSION

Based on this report it could be concluded that high-intensity laser therapy PENS can be an effective treatment for managing the symptoms of far lateral disc herniation in the acute phase in patients with severe pain and paraesthesia. The results of this treatment were stand in 2 years follow-up. More studies to ensure the result of this study is recommended.

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Conflict of Interest: None declared.

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