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Perineural Therapy in Treatment of Chronic Degenerative Lumbosacral Lesions

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Abstract

Background: Low Back Pain (LBP) is the most frequent type of musculoskeletal pain. "It is often recurrent and often has important socio-economic consequences.

Aim of Study: The aim of this study is to evaluate efficacy of perineural injection in treatment of chronic low back pain due to degenerative lumbosacral lesions among sample of Egyptian population.

Patients and Methods: A prospective randomized case controlled study was performed on forty patients with subacute and chronic low back pain; they were diagnosed clinically and radiologically as having degenerative disc lesion. The patients were randomly divided in two groups. In group 1, twenty patients received PNI sessions, the injection was done once weekly for 8 sessions with dextrose 5% (500ml) buffered with 2.4ml sodium bicarbonate (8.4% concentration). In each session; 5-10ml was injected subcutaneously with insulin syringe with angle of introduction 30-40 degrees which targets: Pain located in thoraco-dorsal fascia, the fascia of the erector spinae muscles along T10 to L2 dorsal rami, interspinous tenderness from medial branches of dorsal rami, superior cluneal nerve at 7-8 cm from middle line cross the iliac crest & T10 cross over iliac crest at a distance 8-10cm. In group 2, twenty patients received physical rehabilitation program Transcutaneous Electrical Nerve Stimulation (TENS), Ultrasound (US), infrared light (IR) and massage if needed+ home exercise) 3 days per week 1 day apart for 4 weeks.

Results: Our forty cases were 17 males and 23 females; their mean age was 36.8±4.7. Significant improvement in ROM post-treatment in the group 1 compared to group 2. A highly statistically significant difference in VAS (Visual Analogue Scale) and Oswestry Disability Index (ODI) scores post-treatment in group 1 compared to the group 2. PNI was significantly associated with higher improvements measured by VAS, ROM and ODI when compared with group 2. Significant positive correlation between age and disease duration in the 1st group. Significant positive correlations between ROM & VAS. ODI change showed significant positive correlation with age and VAS change in group 1. In the 1st group; VAS change showed significant positive correlations with each of flexion tips to floor change and lateral flexion. In the 2nd group; VAS change showed positive correlations with flexion change, flexion tips to floor change and lateral flexion. Group 1 showed more positive correlations regarding ROM due to improvement of pain score.

Conclusion: PNI with Dextrose 5% achieved short term improvement in pain and functional abilities in patients with low back pain secondary to degenerative lumbosacral disc lesions at least for a short-term. The degree of improvement of pain and functional abilities was higher in the group that received PNI compared to the group that received physical rehabilitation program.

Key Words: *Perineural therapy – Chronic degenerative – Lumbosacral lesions.*

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Introduction

LOW Back Pain (LBP) is the most frequent type of musculoskeletal pain. "It is often recurrent and has important socio-economic consequences **[1]**". LBP is defined as pain and discomfort in the lumbosacral region, below the twelfth rib and above the gluteal crease. "It is categorized according to its duration from symptoms onset, as acute (<6 weeks), subacute (6 weeks-12 weeks), and chronic (>12 weeks) **[2]**". In up to 24% of the patients, the pain lasts for more than 3 months turning into Chronic Low Back Pain (CLBP) **[3]**.

Ninety percent of low back pain is mechanical. This type of low back pain is the result of overuse, straining, spraining, lifting, or bending that result in ligamentous sprains, muscle pulls or disc herniations. Mechanical low back pain is the most common cause of work related disability and 4% of low back pain is due to herniated disk **[4]**.

Neural prolotherapy or (perineural therapy), first discovered and later significantly developed by Dr. John Lyftogt consists of a series of small injections immediately under the skin targeting painful areas where the nerves are sensitive with

simple and natural substances. The substances Dr. Lyftogt used was a buffered dextrose 5% in sterile water (D5W) with a neutral PH of 7.4 **[5]**.

This type of inflammation is called neurogenic inflammation (N-inflammation) which is produced by certain small sensory nerves that are protein producing (peptidergic). Buffered dextrose injection in low concentration (5%) reduces N-inflammation. The main goal is not to grow new tissue, but to reset nerves to a healthy functioning state **[6]**. Perineural Injection Therapy (PIT) blocks the Transient Receptor Potential Vanilloid-type 1 (TRPV1) receptors which inhibits the propagation of the neuropathic pain signals leading to immediate analgesia. It also inhibits the neurogenic inflammation, and stimulates the release of nerve growth factors, helping in the repair and restoration of the soft tissues. The utility of perineural therapy is based upon several publications supporting its safety and efficacy with positive outcomes in knee pain (Ref) and sacroiliac pain **[7]**.

Aim of this work:

The aim of this study was to evaluate efficacy of perineural injection in treatment of chronic low back pain due to degenerative lumbosacral lesions among a sample of Egyptian population.

Patients and Methods

This was a prospective randomized case controlled study carried out on 40 patients with subacute and chronic low back pain due to degenerative lumbosacral disc lesions. They were diagnosed clinically and radiologically and were recruited from the outpatient clinic of Physical Medicine, Rheumatology and Rehabilitation Department, Ain Shams University Hospitals during the period from 1/3/2018 to 1/9/2018. An informed consent was obtained from every patient prior to his/her participation in the study.

Patient selection:

Inclusion criteria: Patients aged 30-50 years complaining of chronic degenerative lumbosacral pain lasting >3 months were included in the study.

Exclusion criteria:

Patients with the following conditions were excluded from the study:

- Diabetic patients or patients with metabolic syndrome.
- Patients with history of previous back interventional procedures including surgery, injection or epidural anesthesia.
- Obvious ongoing psychiatric illness to ensure objective feedback from the patient after each session.
- Patient with skin pathology at site of injection such as infection or wound.
- Patient with skin malignancy like malignant melanoma to avoid exacerbation of malignancy.
- History of back trauma within 3 months prior to study.
- History of coagulation disturbances to avoid hemorrhagic disorders and avoid bruises after needling.
- Complete rupture of spinal or pelvic ligaments or a tendon.
- Patients with inflammatory back pain.
- Fibromylgia patients.

Patients were randomly distributed into two groups:

1st Group: Twenty patients were subjected to series of perineural injection on weekly basis for eight weeks. Eight injection sessions were performed one week apart under aseptic technique. This group were assessed twice: 4 weeks 8 weeks post-injection.

2nd Group: Twenty patients were subjected to a physical rehabilitation program which was tailored to each patient according to his/her condition for 12 sessions every other day.

All patients (Group 1 & 2) were subjected to the following:

I- Full medical history taking.

II- Physical examination.

1- General examination.

2- Musaculoskeletal examination of the spine:

A- Inspection: In sitting and standing position.

B- Gait.

C- Palpation.

D- ROM.

E- Isometric muscle testing.

F- Tests for examination.

3- Neurological examination:

A- Muscle power: We tested particular muscle groups that correspond to specific nerve root supply.

B- Muscle status.

C- Muscle tone.

D- Sensation.

E- Reflexes.

Assessment of pain: The intensity and character of pain was assessed using visual analogue scale (VAS) **[8]** scored from 0-10 with 0 representing no pain and 10 representing severe pain. Each participant was instructed to draw a mark along the line that corresponded to his/her own evaluation of the intensity of his/her pain.

III- Functional assessment: It was done according to Oswestry disabil ityindex (ODI) **[9]** version (2.0) for functional assessment. This questionnaire gives information about how the back or leg pain affects the ability of the patient to manage his/her everyday life including pain intensity, lifting, personal care (washing, dressing etc), walking, sitting, standing, sex life (if applicable), social life, sleeping, travelling. The patient was instructed to answer the questions by checking one box in each section for the statement which best applies to him/her.

IV- Radiological investigations: Plain X-ray of lumbosacral spine Anteroposterior (AP) view, lateral view (Lat), right and left oblique views was performed.

V- Laboratory investigations: The following laboratory tests were done, and measured according to the standard laboratory methods: Complete Blood Count (CBC), Erythrocyte Sedimentation (ESR), serum CRP (C-reactive protein), Fasting Blood Sugar (FBS), Post Prandial Sugar (PPS), lipid profile.

VI- Perineural injection technique to group 1: First, the procedure was explained to the patient and patient's consent was obtained prior to injection. Patients were instructed to discontinue drugs that may mask the pain such as analgesics 1 week before starting of the study. PNI targets thoracodorsal fascia, the fascia of the erector spinae muscles along T10 to L2 dorsal rami, Interspinous tenderness from medial branches of dorsal rami, Superior cluneal nerve at 7-8cm from middle line cross the iliac crest & T10 cross over iliac crest at a distance 8-10cm and middle cluneal nerve S1, 2, 3 **[6]**.

Statistical analysis:

The collected data was revised, coded, tabulated and introduced to a PC using Statistical package for Social Science (IBM Corp. Released 2011. IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp.). Data were presented and suitable analysis was done according to the type of data obtained for each parameter. $p<0.05$ is considered significant, $p<0.01$ is considered highly significant, $p<0.001$ is considered very highly significant.

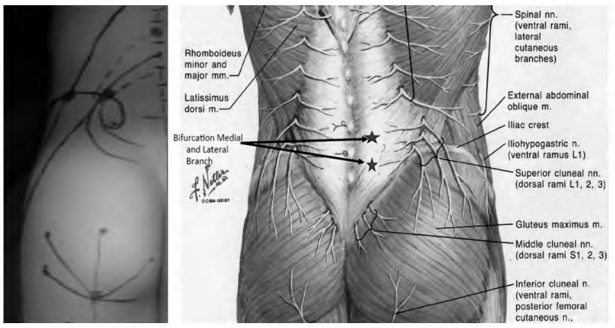

Fig. (1): Nerves of back and surface anatomy for it **[10]**.

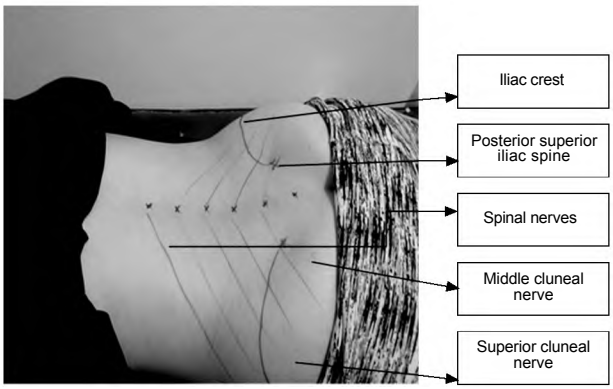

Fig. (2): Sites of injection in one of our patients.

Results

Mean age ± SD of studied patients was 36.8 ± 4.7, they were 17 men (42.5%) and 23 women (57.5%), their mean BMI ± SD was 33.2±3. 2. Mean hemoglobin concentration ± SD was 11.2± 0.9, and mean CRP ± SD was 1.5±0.4. Mean ESR± SD was 28.6±3.2.

ODI score, VAS score, flexion ROM by goniometer, flexion tips to floor, lateral flexion were significantly decreased post-injection compared to pre-injection. Tables (1,2) display the outcome variable before and after treatment in the perineural and physiotherapy groups denoting more significant change in the peri neural group regarding VAS and ROM.

ODI change showed significant positive correlation with age in group 1, while it showed highly significant with VAS change in both group 1 & 2. ODI changes showed positive significant correlation with Flexion tips to floor change in group 2. ODI change showed also highly significant with rotation change in group 2.

In the 1 st group; VAS change showed significant positive correlations with each of CRP and lateral flexion while showed highly significant with flexion tips to floor and lateral flexion tips to floor change; while no significant correlations with other studied

parameters. In the 2nd group; VAS change showed only significant correlations with lateral flexion tips to floor and highly significant correlation with lateral flexion change, and flexion tips to floor change while it showed very high significant correlation with flexion and rotation.

In group 1 flexion with tap measure change showed highly significant correlation with lateral flexion tips to floor. In group 2 flexion with tap measure change showed significant correlation with lateral flexion tips to floor and highly significant with flexion tips to floor change and rotation change.

In group 1, flexion tips to floor change showed highly significant correlation with lateral flexion and lateral flexion tips to floor change. It also shown significant correlation with rotation change, while in the second group, flexion tips to floor change showed highly significant correlation with rotation change. Other than that results in the both groups, flexion tips to floor change had no significant correlation with the other studied parameters.

In the first group side bending change showed no significant correlation in all studied parameters but in the second group it showed highly significant correlation with rotation change.

In group 1, side bending with tap change showed no significant correlation with any studied parameters, but in group 2 it showed significant correlation with only rotation change.

Extension change showed significant positive correlation with age group 1. Otherwise, no significant correlations were found between extension change with other studied parameters in group 1 and group 2.

Table (1): Comparison of the outcome variables before and after treatment in the patients treated by PNI (group 1)

	Before treatment N=20		After treatment N=20		*p*	Significance
	Mean	SD	Mean	SD		
ODI	19.4	3.3	15.8	2.1	<0.001	VHS
VAS (mm)	2.7	0.9	0.8	1	<0.001	VHS
Flexion (by goniometer)	13.4	1.6	15.3	3.9	<0.001	VHS
Flexion tips to floor	1.4	0.3	1.2	1.1	<0.05	VHS
Lateral flexion	30.6	2.1	32.6	1.9	<0.001	VHS
Lateral flexion tips to floor	17.6	0.9	16.6	0.8	<0.001	VHS
Rotation	39.2	3.4	42.4	2.2	<0.001	VHS
Extension	6.2	1.7	6.9	1.2	0.009	HS

NS : Non Significant. HS : Highly Significant.
S : Significant. VHS : Very Highly Significant.

Table (2): Comparison of the outcome variables before and after treatment in cases treated by physical rehabilitation.

	Before treatment N=20		After treatment N=20		*p*	Significance
	Mean	SD	Mean	SD		
ODI	16.3	3.3	13.2	2.8	<0.001	VHS
VAS (mm)	4.1	1.3	3	1	0.001	HS
Flexion (by goniometer)	14	0.8	16.1	4.3	<0.001	VHS
Flexion tips to floor	2.1	0.7	1.9	1.3	0.003	HS
Lateral flexion	30.1	0.7	31.1	1.1	0.001	HS
Lateral flexion tips to floor	16.3	0.3	16.2	0.3	0.002	HS
Rotation	39.8	0.6	40.8	1.5	0.003	HS
Extension	18.1	5.2	19.6	6.2	0.007	HS

NS : Non Significant. HS : Highly Significant.
S : Significant. VHS : Very Highly Significant.

Table (3): Changes of outcome variables from baseline to follow-up visits in the 1st group and the 2nd group.

Changes between before and after treatment (%)	Group 1 N=20		Group 2 N=20		*p*	Significance
	Mean	SD	Mean	SD		
ODI	−17.4	5.7	−17.9	5.3	0.916	NS
VAS (mm)	−70	21.1	−27.5	9.1	0.001	HS
Flexion (by goniometer)	14.5	3.3	6.4	1.6	0.001	HS
Flexion tips to floor	−25.3	6.8	−6.7	2.8	0.002	HS
Lateral flexion	6.9	1.1	3.2	1.0	0.024	HS
Lateral flexion tips to floor	−5.5	1.5	−0.9	0.3	<0.001	VHS
Rotation	8.4	2.2	2.5	0.7	<0.001	VHS
Extension	11.3	2.2	8.3	1.6	0.007	HS

NS: Non Significant. HS : Highly Significant.
S : Significant. VHS : Very Highly Significant.

Table (4): Correlation of ODI change with other studied parameters in group 1 and group 2.

	ODI change					
	Group 1			Group 2		
	r	*p*	Sig.	*r*	*p*	Sig.
• Age	0.472	0.036	S	−0.159	0.504	NS
• BMI	−.0334	0.150	NS	0.063	0.793	NS
• CRP	0.437	0.054	NS	0.118	0.620	NS
• ESR	−0.048	0.841	NS	0.096	0.686	NS
• Duration	0.263	0.263	NS	−0.373	0.106	NS
• VAS change	0.671	0.001	HS	0.686	0.001	HS
• Flexion change	0.197	0.405	NS	0.429	0.059	NS
• Flexion tips to floor change	0.094	0.694	NS	0.489	0.029	S
• Lateral flexion change	−.0111	0.640	NS	−0.251	0.286	NS
• Lateral flexion tips to floor change	0.368	0.110	NS	0.433	0.057	NS
• Rotation change	0.208	0.379	NS	−0.567	0.009	HS
• Extension change	0.001	0.999	NS	0.218	0.520	NS

NS : Non Significant. HS : Highly Significant.
S : Significant. VHS : Very Highly Significant.

Table (5): Correlation of VAS change with other studied parameters in group 1 and group 2.

	VAS change					
	Group 1			Group 2		
	r	*p*	Sig.	*r*	*p*	Sig.
Age	0.173	0.466	NS	–0.069	0.772	NS
BMI	–0.401	0.080	NS	–0.050	0.833	NS
CRP	0.103	0.667	NS	–0.003	0.990	NS
ESR	0.095	0.689	NS	0.104	0.663	NS
Duration	0.199	0.400	NS	–0.406	0.076	NS
Flexion change	0.244	0.301	NS	0.775	<0.001	VHS
Flexion tips to floor change	0.664	0.001	HS	0.598	0.005	HS
Lateral flexion change	–0.516	0.020	S	–0.574	0.008	HS
Lateral flexion tips to floor	0.590	0.006	HS	0.522	0.018	S
Rotation change	–0.138	0.563	NS	–0.832	<0.001	VHS
Extension change	–0.240	0.308	NS	0.299	0.300	NS

NS : Non Significant. HS : Highly Significant.
S : Significant. VHS : Very Highly Significant.

Table (6): Correlation of flexion with tap measure change with other studied parameters in both groups.

	Flexion with tap measure change					
	Group 1			Group 2		
	r	*p*	Sig.	*r*	*p*	Sig.
Age	–0.328	0.158	NS	0.033	0.891	NS
BMI	–0.105	0.658	NS	–0.151	0.526	NS
CRP	0.020	0.934	NS	–0.231	0.327	NS
ESR	–0.353	0.127	NS	0.109	0.648	NS
Duration	–0.056	0.813	NS	–0.273	0.244	NS
Flexion tips to floor change	0.424	0.062	NS	0.653	0.002	HS
Lateral flexion change	–0.557	0.011		–0.393	0.087	NS
Lateral flexion tips to floor	0.598	0.005	HS	0.521	0.018	S
Rotation change	–0.231	0.327	NS	–0.684	0.001	HS
Extension change	–0.349	0.132	NS	0.324	0.162	NS

NS : Non Significant. HS : Highly Significant.
S : Significant. VHS : Very Highly Significant.

Table (7): Correlation of flexion tips to floor change with other studied parameters in group 1 and group 2.

	Flexion tips to floor change					
	Group 1			Group 2		
	r	*p*	Sig.	*r*	*p*	Sig.
• Age	–0.412	0.071	NS	–0.093	0.697	NS
• BMI	–0.248	0.292	NS	–0.160	0.500	NS
• CRP	0.383	0.096	NS	0.123	0.606	NS
• ESR	0.178	0.452	NS	0.218	0.356	NS
• Duration	–0.156	0.511	NS	–0.212	0.369	NS
• Lateral flexion change	–0.568	0.009	HS	–0.389	0.090	NS
• Lateral flexion tips to floor change	0.676	0.001	HS	0.332	0.153	NS
• Rotation change	–0.485	0.030	S	–0.638	0.002	HS
• Extension change	–0.624	0.003	HS	0.315	0.157	NS

NS : Non Significant. HS : Highly Significant.
S : Significant. VHS : Very Highly Significant.

Table (8): Correlation of side bending change with other studied parameters in group 1 and group 2.

	Side bending change					
	Group 1			Group 2		
	r	*p*	Sig.	*r*	*p*	Sig.
Age	0.015	0.951	NS	–0.168	0.479	NS
BMI	0.070	0.771	NS	–0.272	0.246	NS
CRP	–0.013	0.958	NS	–0.023	0.923	NS
ESR	0.239	0.310	NS	–0.048	0.842	NS
Duration	–0.048	0.840	NS	–0.102	0.668	NS
Lateral flexion tips to floor	–0.408	0.074	NS	–0.234	0.321	NS
Rotation change	0.213	0.368	NS	0.640	0.002	HS
Extension change	0.254	0.280	NS	0.278	0.352	NS

NS : Non Significant. HS : Highly Significant.
S : Significant. VHS : Very Highly Significant.

Table (9): Correlation of side bending with tap with other studied parameters in PNI and physiotherapy groups.

	Side bending with tap change					
	Group 1			Group 2		
	r	*p*	Sig.	*r*	*p*	Sig.
Age	–0.207	0.380	NS	0.001	0.997	NS
BMI	–0.283	0.227	NS	0.183	0.440	NS
CRP	0.201	0.394	NS	0.002	0.993	NS
ESR	0.012	0.961	NS	0.236	0.316	NS
Duration	–0.131	0.581	NS	–0.248	0.292	NS
Rotation change	–0.244	0.300	NS	–0.458	0.042	S
Extension change	–0.376	0.102	NS	0.170	0.671	NS

NS: Non Significant. HS : Highly Significant.
S : Significant. VHS: Very Highly Significant.

Discussion

Low Back Pain (LBP) is currently a common and costly health problem in industrialized communities **[11,12]** and is considered one of the major causes of disability in persons under the age of 45 years **[13-16]**.

The main goals of treatment in individuals with LBP are to alleviate the pain and improve the functional abilities **[17,18]**. There are various treatment modalities for the management of chronic LBP, including medical treatment, physical therapy, massage, manipulation, traction, and therapeutic exercises. Among them, physical rehabilitation still has an important role in the treatment of chronic LBP. However, due to the diversity and cost of chronic LBP treatments and the lack of randomized and controlled studies on the effectiveness of these treatment modalities, there is no consensus on which treatment modality is the most appropriate **[19]**.

The alleviation of pain by using local anesthetic agents is an ancient tradition and they may be used

in functional disorders. Neural therapy is based on normalizing dysfunctional nervous system **[20]**.

The Egyptian literature lacks sufficient data as regards the effectiveness of neural therapy in the treatment of degenerative back pain compared to physical rehabilitation. This motivated us to conduct this thesis to evaluate efficacy of perineural injection in treatment of chronic low back pain due to degenerative lumbosacral lesions among sample of Egyptian population.

The results of the present study showed that pain and functional ability were improved and it is may reflect into quality of life (QOL).

In our study, we found significant improvement in Visual Analogue Scale score (VAS) and mean score of ODI post-treatment compared to pre-treatment in Group 1. These results agree with the results obtained by Wu et al. **[21]** and Wu et al. **[22]** who stated that the mechanism underlying the effects of PIT with dextrose 5% buffered with sodium bicarbonate is unknown and may be multifactorial. Dextrose can reduce neurogenic inflammation via the inhibition of capsaicin-sensitive receptors to stop the secretion of both substance p and calcitonin gene-related peptide, which are known to induce pain and swelling of the nerve and/or surrounding tissue **[23]**. Also, Dextrose stimulates the release of nerve growth factors, helping in the repair and restoration of the soft tissue **[24]**. Nerve hydrodissection may also contribute to the therapeutic effect of D5W **[21]**.

In group 2 in our study, there was significant improvement of mean scores of VAS and ODI post-treatment compared to pre-treatment but to a lesser extent than the group 1. This may implicate that PNI may have greater effect on pain and functional abilities compared to the physical rehabilitation. Patients suffering from chronic LBP in group 2 have showed significant improvements in pain, ROM and disability but lesser than the 1 st group with a combined home exercise and physical therapy (Hotpacks + US + TENS) and it is similar to Doğan et al. **[25]** who demonstrated that patients on rehabilitative programme included (Hotpacks + US + TENS) show improvement than patients on home exercise only. There was also improvement of pain and functional abilities in group 2 agree with a study conducted by Borman and colleagues in 2003 and Durmus and colleagues in 2010 who found statistically significant improvements in pain and disability scores with a 10 sessions of physical therapy program in the form of Hotpack, ultrasound and therapeutic exercises **[26,27]**.

To our knowledge there were no available other studies for comparison of the PNI with ours. However, our results as improvement of VAS and ODI seems encouraging. In group 1 and 2 in our study, lateral flexion and extension increased post-treatment which mostly occurred secondary to improvement of pain. In group 1 also in our study, ODI positively correlated with age, VAS and VAS change among visits. These positive correlations are expected as functional abilities normally decline with age. Also, as pain increases, disability increases. Further investigation of these correlation may be needed in future studies. The major limitations of the present study are that it has provides only short-term outcomes. Future study of long term effect of PNI should be done for proper evaluation of this modality with a promising short term effect.

Conclusion:

PNI with Dextrose 5% achieved short term improvement in pain and functional abilities in patients with low back pain secondary to degenerative lumbosacral disc lesions. The degree of improvement of pain and functional abilities was higher in the group that received PNI compared to the group that received physical rehabilitation program.

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الحقن حول العصب
فى علاج الآمراض المزمنة
لآلام الفقرات القطنية والعجزية

\المقدمة: أجريت هذه الدراسة لتحديد فعالية الحقن العجانى من دكستروز ٥٪ مخزنة مع بيكروبونات الصوديوم تحت الجلد فى علاج المرضى الذين يعانون من آلام أسفل الظهر المزمنة الناجمة عن أمراض القرص القطنى التنكسى.

\المرضى وطرق \البحث: كانت دراسة عشوائية مستقبلية أجريت على أربعين مريضاً يعانون من آلام أسفل الظهر المزمنة. تعرض جميع المرضى لأخذ التاريخ الكامل، والفحص السريرى الكامل بما فى ذلك الفحص المفصل للظهر والتقييم العصبى للأطراف السفلية. تم تقسيم المرضى إلى مجموعتين. فى المجموعة الأولى، تلقى عشرين مريضاً جلسات أمراض المناعة الذاتية، تم الحقن مرة واحدة إسبوعياً لمدة ٨ جلسات مع دكستروز ٥٪ (٥٠٠مل) مخزنة مع ٢.٤مل من بيكربونات الصوديوم (تركيز ٨.٤٪). فى كل جلسة، تم حقن ٥-١٠مل تحت الجلد بمحقنة الأنسولين بزاوية مقدمة ٣٠-٤٠ حول الأعصاب القطنية والعجزية وفقاً لخريطتنا. فى المجموعة ٢، تلقى عشرين مريضاً برنامج إعادة التأهيل البدنى (TENS، الولايات المتحدة، الأشعة تحت الحمراء والتدليك إذا لزم الأمر + تمرين منزلى) ٣ أيام فى الإسبوع لمدة يوم واحد لمدة ٤ أسابيع.

\النتائج: حالاتنا الأربعين كانت ١٧ من الذكور و٢٣ من الإناث. وكان متوسط أعمارهم ٣٦.٨±٤.٧. تحسن كبير فى علاج ما بعد نطاق الحركة فى المجموعة ١ مقارنة بالمجموعة ٢ ، هناك فرق ذو دلالة إحصائية عالية فى درجات VAS وODI بعد العلاج فى المجموعة ١ مقارنة بالمجموعة ٢، إرتبط PNI بشكل كبير بتحسن أعلى تم قياسه بواسطة VAS وROM وODI عند مقارنته بالمجموعة ٢، إرتباط إيجابى كبير بين العمر ومدة المرض فى المجموعة الأولى، الإرتباطات الإيجابية الكبيرة بين ROM وVAS، أظهر تغير ODI إرتباط إيجابى كبير مع العمر وتغير VAS فى المجموعة ١، فى المجموعة الأولى، أظهر تغيير VAS إرتباطات إيجابية كبيرة مع كل من CRP، ونصائح الإنثناء لتغيير الأرضية والإنثناء الجانبى، فى المجموعة الثانية، أظهر تغيير VAS إرتباطات إيجابية مع تغيير الإنثناء، ونصائح الإنثناء لتغيير الأرضية والإنثناء الجانبى، أظهر تغير الإرشاد علاقة إيجابية مع الفئة العمرية ١.