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LONG TERM REHABILITATION RESULTS IN PATIENTS WITH ORTHOPEDIC IMPLANTS OF THE UPPER AND LOWER EXTREMITIES

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ABSTRACT

In the last 5 decades, with the improvement of surgical treatment, patients with orthopedic implants need long-term rehabilitation. A major problem of early rehabilitation is that many physiotherapy modalities are unsuitable for patients with metal implants due to contraindications.

Purpose: The aim of the present study is to analyze and compare the effects of application of physical therapy modalities in patients with orthopedic implants of upper and lower extremity.

Material/Methods: The contingent of the study were 240 patients with orthopedic implants who meet the inclusion criteria. We used four methods to track the signs at five different periods for patients. Patients were divided initially into groups according to the anatomical area where the implant was placed and the joint contracture. Patients from each group were randomly assigned to one of two treatment groups - kinesitherapy and Multiwave Locked System (MLS) laser treatment or kinesitherapy and deep oscillation treatment. **Results:** Patients in the eight treatment groups have both short-term and long-term improvement of functional status and level of pain questionnaires, centimeters at the four moments for each research joint, goniometry of each research joint and spontaneous pain in the VAS. The comparative analysis between the two therapeutic programs did not report a statistically significant difference in one of the methods. **Conclusions:** When it comes to public health, Deep Oscillation and MLS laser therapy can significantly impact treating symptoms in patients with orthopedic implants in their upper and lower limbs. This can lead to a shorter period of forced rest and help prevent complications from operative treatment. It is recommended that longer-term results be followed to establish the statistically significant superiority of one of the complex therapies we applied.

Keywords: orthopedic implants, kinesitherapy, Deep Oscillation Therapy, Multiwave Locked System laser

INTRODUCTION

Extremity fractures are socially significant diseases due to treatment costs and disability [1]. Thanks to the development of orthopedic surgery as well as drug prophylaxis, the treatment of patients with limb fractures requires long-term rehabilitation. Several protocols are known for early rehabilitation with kinesitherapy, but postoperative complications can compromise the patient's recovery. One major issue with physiotherapy is that many physical treatments are unsuitable for patients with metal implants due to contraindications [2]. Recently, MLS laser [3] and deep oscillation treatment [4] have been developed as an alternative approach. These methods are widely used to reduce fibrosis, joint contractures, and swelling and to prevent potential wound complications [5].

The aim of the present study is to analyze and compare the effects of application of physical therapy modalities in patients with orthopedic implants of upper and lower extremity.

MATERIALS AND METHODS

This prospective, randomized, parallel study was conducted with permission from the Research Ethics Committee at Varna Medical University.

To guarantee the conclusions drawn from the results, a preventive examination was carried out for the presence of a therapeutic emission of the laser device before and after conducting the experiment.
The contingent of the study were 240 patients aged 20 to 80 years with orthopedic implants who meet the inclusion criteria.
All enrolled patients were randomly assigned to treatment groups using an online generated randomization sequence.
Methods that were used for tracking the signs are: questionnaires - Shoulder Pain and Disability Index (SPADI) [6], The Mayo Elbow Performance Score (MEPS) [7], Knee Injury and Osteoarthritis Outcome Score (KOOS) [8], The Foot and Ankle Disability Index (FADI) [9], centimeter and goniometry evaluation, pain according to Visual Analogue Scale (VAS) [10], at five different periods for patients of the eight subgroups.
Statistical methods were used to process the data and analyze the results.
Patients were divided initially into groups according to the anatomical area where the implant was placed and the joint contracture - shoulder (group A), elbow (group B), knee (group C), and ankle (group D). Patients from each group were randomly assigned to one of two treatment subgroups - kinesitherapy and MLS laser treatment (subgroups A1, B1, C1 and D1) or kinesitherapy and deep oscillation treatment (subgroups A2, B2, C2 and D2).
All patients were assessed at five different time points: T0 - at baseline before starting treatment, T1 - after completing the therapeutic course of early rehabilitation, T2 - after completing the therapeutic course of rehabilitation up to one month, T3 - after completing the the therapeutic course of rehabilitation up to three months and T4 - at the sixth month after the start of treatment.

RESULTS

Pairwise comparison showed that there was a statistically significant difference of time effect ($p<0.000$) between all pairs in subgroup A1 and A2 - Flexion, Abduction, Internal rotation (F0) and SPADI; subgroup B1 - Spontaneous VAS pain, MEPS; subgroup B2 - Spontaneous VAS pain; subgroups C1 and C2 - KOOS Symptoms; subgroups D1 and D2 – Dorsiflexion.
Pairwise comparison showed that there was a statistically significant difference of time effect ($p<0.000$) between all pairs and no statistically significant difference between T0-T1 in subgroup C1 Flexion ($p<1.000$), subgroup D1 ($p<0.168$) and D2 ($p<0.179$) - Ankle circumference difference; between T0-T1 ($p<1,000$) and T3-T4 ($p<1,132$) in subgroup C2 Changes in the ROM – extension.
The pairwise comparison showed that there was a statistically significant difference in the effect of time ($p<0.000$) between all pairs and no statistically significant difference between T1-T2 in subgroup A1 ($p<1.000$) and A2 ($p<1.000$) - External rotation (F0); subgroup C1 - Knee circumference difference ($p<0.854$), Changes in the ROM - extension ($p<1.000$), Flexion ($p<1.000$), subgroup C2 - Knee circumference difference ($p<0.509$), Spontaneous VAS pain ($p<1.000$), KOOS Pain ($p<0.696$), KOOS ADL ($p<1,000$), KOOS QOL ($p<1,000$. The pairwise comparison showed that there was a statistically significant difference in the effect of time ($p<0.000$) between all pairs and no statistically significant difference between T2-T3 in subgroup A1 ($p<1.000$) and A2 ($p<1.000$) - Spontaneous VAS pain ($p<1,000$); subgroup C1 - Spontaneous VAS pain ($p<1,000$), KOOS Pain, ($p<0,809$), KOOS ADL ($p<1,000$), KOOS QOL ($p<1,000$).
Pairwise comparison showed that there was a statistically significant difference of time effect ($p<0.000$) between all pairs and no statistically significant difference between T3-T4 in subgroup B1 - Flexion ($p<1,000$), Extension ($p<0.101$), Pronation ($p<1.000$), Supination ($p<0.498$); subgroup B2 - Flexion ($p<1,000$), Extension (°) ($p<0,101$), Pronation ($p<1,000$), Supination ($p<0,498$), MEPS ($p<0,344$); subgroup D1 - Plantar Flexion ($p<0.563$), Spontaneous VAS pain ($p<0.089$), FADY ($p<0.117$); subgroup D2 - Plantar Flexion ($p<0.789$), Spontaneous VAS pain ($p<0.098$), FADY ($p<0.158$).

After the injury of the elbow joint before treatment (T0) the measured indicators are not reliable. After the operation, the elbow joint is in a relaxed position up to 90°. A reduction in geometry reports an improvement and reduction in stiffness.

No statistically significant difference was found in the between-group analysis of the treatment effects of the two therapeutic methods in all measures (Table 1).

Table 1. Group Statistics

			T0		T1		T2		T3		T4
Sig. (2-tailed)	A1-A2	Flexion (°)	0,351	0,351	0,407	0,407	0,584	0,584	0,22	0,22	0,699
		Abduction (°)	0,4	0,4	0,55	0,55	0,509	0,509	0,663	0,663	0,54
		External Rotation (F0) (°)	0,731	0,731	0,694	0,694	0,878	0,878	0,959	0,959	0,748
		Internal Rotation (F0) (°)	0,493	0,493	0,568	0,568	0,581	0,581	0,545	0,545	0,787
		VAS mm	0,839	0,839	0,611	0,611	0,813	0,813	0,777	0,777	0,786
		SPADI (%)	0,764	0,764	0,805	0,805	0,842	0,842	0,691	0,691	0,478
	B1-B2	Flexion (°)			0,461	0,461	1	1	0,61	0,61	0,915
		Extension (°)			0	0	1	1	0,717	0,717	0,799
		Pronation (°)			0,728	0,728	0,902	0,902	0,621	0,621	0,621
		Supination (°)			0,012	0,013	0,013	0,013	0,519	0,519	0,317
		VAS mm			0,966	0,966	0,651	0,651	0,571	0,571	1
		MEPS			1	1	0,259	0,259	0,138	0,138	0,184
	C1-C2	circumference difference mm	0,405	0,405	0,147	0,147	0,083	0,083	0,321	0,322	0,371
		Flexion (°)	-0,033	-0,033	-0,333	-0,333	1	1	0,333	0,333	0,5
		Extension (°)	-0,733	-0,733	-0,333	-0,333	0,5	0,5	0,4	0,4	0,367
		VAS mm	0,653	0,653	0,599	0,599	0,756	0,756	0,782	0,782	0,779
		KOOS Pain	0,965	0,965	0,83	0,83	0,977	0,977	0,988	0,988	0,691
		KOOS Symptomes	0,98	0,98	1	1	1	1	1	1	1
		KOOS ADL	0,931	0,931	0,823	0,823	0,967	0,967	0,917	0,917	0,816
		KOOS QOL	0,627	0,627	0,603	0,603	0,553	0,553	0,99	0,99	0,965
	D1-D2	circumference difference mm	0,924	0,924	0,697	0,697	0,678	0,678	0,294	0,294	0,387
		Dorsiflexion (°)	0,595	0,595	0,656	0,656	0,863	0,863	0,651	0,651	0,638
		Plantar Flexion (°)	0,401	0,401	0,672	0,672	1	1	1	1	1
		VAS mm	0,674	0,674	0,819	0,819	0,889	0,889	1	1	1
		FADY (%)	0,123	0,123	0,093	0,093	0,881	0,881	0,82	0,82	0,724

DISCUSSION

When it comes to public health, Deep Oscillation and MLS laser therapy can significantly impact treating symptoms in patients with orthopedic implants in their upper and lower limbs. This can lead to a shorter period of forced rest and help prevent complications from operative treatment. It is recommended that longer-term results be followed to establish the statistically significant superiority of one of the complex therapies we applied.

CONCLUSIONS

Patients in the eight treatment subgroups have both short-term and long-term improvement of functional status and level of pain questionnaires, centimeters at the four moments for each research joint, goniometry of each research joint and spontaneous pain in the VAS. The comparative analysis between the two therapeutic programs did not report a statistically significant difference in one of the methods.

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