

Kinesitherapy in Brachial Plexus Injury– Presentation of Case

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Abstract– We needed evidence as to which exercises were appropriate in the treatment of patients with brachial plexus impairment.

Presentation of kinesitherapeutic methodology and reporting results of its annual application to patients with traumatic injury to the plexus brachialis with motor deficits of the left upper limb.

Our subject of treatment was a 32 year-old man with traumatic brachial plexus, to whom we conducted a systematic physical therapy, including therapeutic massage of the shoulder girdle and upper limb, proprioceptive neuromuscular facilitating techniques, analytical gymnastics, exercises for grip training.

As a result of the applied kinesitherapeutic methodology the muscle strength of the upper arm and forearm were increased. There has been an overall improvement of functional upper limb gestures and the grip strength.

To remove dysfunctions and disabilities in patients with brachial plexus impairment it is necessary to use the patient's locomotive apparatus in its dynamics and complexity of movements.

Index Terms–brachial plexus, impairment, kinesitherapy

I. INTRODUCTION

Among the diseases of the nervous system brachial plexus impairment is not highly frequent, but is characterized by a very slow pace of recovery, its recovery is not always successful and is related to a prolonged and expensive treatment, and despite the care there often remain residual injuries, different in extent and significance

The reinnervation of neurons depends on the degree of impairment. An important prerequisite for a good kinesitherapeutic treatment result is the improvement and the potentially better recovery of proprioception and neuro-muscular atrophy and function of the hand. A necessary condition for the full recovery of the patients with brachial plexus impairment is developing motivation for their active cooperation during a prolonged neurorehabilitation .

II. AIM OF THE STUDY

The objective of this article is to present a kinesitherapeutic methodology and the results of its annual application to a patient with traumatic injury to the brachial plexus with motor deficits of the left upper limb.

III. PATIENT AND METHODS

The object of our attention was a 32 year-old man with a traumatic brachial plexus, to whom we conducted a systematic physical therapy. The prescription of the disease from the receipt of neurological impairment (injury) to the commencement of kinesitherapy was 20 days, when resuscitative and medicated treatment was held.

We tracked the changes in centimeter measurement and manual muscle testing at the beginning of the kinesitherapy, in stages and until completion of neurorehabilitation. We compared the studies with those of the phased EMG. We devised our kinesitherapeutic methodology according to the results. Each daily activity lasted from 40 min to an hour of physical therapy for neurological injury to the plexus.

The aim of the conducted kinesitherapy was to assist, with kinesitherapeutic means of regenerative processes and motor function, the general neurorehabilitation plan to restore the upper limb.

The kinesitherapeutic scheme included: healing massage of the shoulder girdle and upper extremity - 20 minutes, proprioceptive neuromuscular facilitating techniques (Kabat diagonals as technical means) - 20-25 minutes; analytical gymnastics - for all the muscles involved in the injured MMT in two sets of 30-50 times for each movement according to estimate - 20 minutes; exercises to train the types of grips - spherical, fist, peak, cylindrical, hook, primary, fine, secondary fine, key grip and lateral grip for 15-20 minutes.

After scoring 3 on MMT for muscles acting in shoulder and elbow joint, we included analytical exercises against moderate resistance lasting for 15 minutes.

We conducted electrophoresis with nivalin, in order to reduce degeneration and to enhance the trophics and blood supply to the limb. The applied electrostimulation reinforced the effect of kinesitherapy and contributed to the strengthening procedure by stimulating each of the injured muscles separately.

IV. RESULTS AND DISCUSSION

Comparing the initial values of the conducted studies we found that, as a result of the applied kinesitherapeutic methodology, muscle strength of the upper arm and forearm was increased. There was an overall improvement of functional upper limb gestures and the grip power (tab. 1 and tab. 2).

Given the nature of the disease and the long-lasting disability in the upper extremity, we found a good functional recovery of upper limb.

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Table 1. Results from MMT at the beginning and end of the study.

Muscles	Beginning	End
m.deltoideus	0	4
m.brachialis	0	4
m.brachioradialis	0	4
m.biceps brachii	0	5
m. triceps brachii	2-	4+
m. supinator	0	4 -
m. pronator teres	0	4 -
m. pronator quadratus		
m. flexor carpi ulnaris	0	4
m. flexor carpi radialis	0	4
m. extensor carpi radialis	0	4
m. extensor carpi ulnaris	0	4
m. flexor digitorum superficialis	0	4
m. flexor digitorum profundus	0	4
m. interossei dorsalis	0	4
m. interossei palmaris	0	4
m. lumbricales	0	4
m. flexor pollicis longus	0	4
m. flexor pollicis longus	0	4
m. extensor pollicis longus	0	4
m. extensor pollicis brevis	0	4
m. abductor pollicis longus	0	4
m. abductor pollicis brevis	0	4
m. opponens pollicis	0	4
m. adductor pollicis	0	4

Table 2 Centimeter measurement of upper limb at the beginning and end of the study

	Beginning	End
Armpit measurement	43	44, 5
Elbow measurement	28	31
Forearm measurement	25	27
Wrist joint measurement	16	16,5
Fist measurement	20	20, 5

The procedure debuted with therapeutic massage applied before kinesitherapy. In this way blood and lymphatic

circulation were improved as well as subcutaneous and skin trophics and muscle proprioception. The massage helped the neuro-muscle reinnervation and the activation of the motor function of the hand.

The choice of technical means of the applied methodology was based on electromyographically proven research data and the muscle testing results.

In the early course of treatment we applied passively diagonal movement patterns, at a normal amplitude, while being careful not to overextend the hypotrophic muscles. The passive exercises improved blood circulation and maintained the activity of the receptor motor centers.

As a result the hypertrophy of the muscles, which were anatomically intact and potentially capable of function, was improved.

By applying passive exercises we protected the limb from contractures and maintained the corporal scheme of movement and also the amount of movement in the joints of the upper limb. We also used summation and irradiation of excitement, stretching reflex, front, side and rear support reflex.

These exercises helped to activate a large number of proprioceptive impulses in search of active movements . An important point in the kinesitherapeutic methodology was posture treatment, which was done with a static daily orthosis. The orthosis contributed to the maintenance of the flexors of the upper limb with distant joint locks as a preventive measure from installment of contractures .

For maintenance of the correct scapula-humeral rhythm we applied mobilization techniques to the blade, as well as exercises to strengthen the scapula retractors (m. Trapezius pars transversalis, mm. Romdoidei major et minor) from the front and side leg.

With the recovery of muscle strength we included active exercises and diagonal patterns of movements by Kabat against little resistance. These exercises have contributed not only to the build-up of muscle strength, but through them the proprioceptive information was enhanced. Through them the patient supplemented his idea of the strength needed to perform the corresponding movement and the direction of the applied effort.

The exercises with resistance increased the reverse afference, even when the movement could not be performed in full. With the application of resistance the movement passed in an active-assisted, without breaking the kinetic chain The inclusion of analytical training of the injured muscles increased the effect of the recovery cummulatively, which is confirmed by the results of centimeter measurement and the patient’s manual testing.

We practiced the different grips by applying various degrees of exercises with different gym equipment. As a result, the patient recovered to a level of a good prehensile ability, which allowed him to return to his professional activities by removing the inability.

CONCLUSION

As a result of the applied kinesitherapeutic methodology the patient recovered the functional upper limb gestures and achieved good power grip.

The dysfunction was removed, which led to his return to professional activity. That is why, we have good reasons to recommend the inclusion of the principles of proprioceptive neuromuscular facilitation in neurorehabilitation in cases of brachial plexus injury.

As a result of the foregoing text we can conclude that the removal of the dysfunctions and disabilities in patients with impaired upper limb makes it necessary for the patient to use their locomotive apparatus in its dynamics and complexity of movements.

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