MASSAGE AS A PART OF INTEGRATIVE REHABILITATION OF PATIENTS WITH CHRONIC PULMONARY DISORDERS

(A review of the medical literature)

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Scientific data supports the clinical application of massage therapy as part of an integrative approach to the treatment of chronic respiratory disorders.

The clinical impact of therapeutic and medical massage on patients with pulmonary abnormalities is based on the fact that massage therapy is the sole medical modality capable of eliminating protective tension in the respiratory muscles, restoring their normal anatomical length and normal resting muscle tone, mechanically restoring elasticity of the soft tissue of the thoracic cage, and helping to maintain its elastic recoil during respiration.

While physical therapy and respiratory therapy are an accepted part of the somatic rehabilitation of patients, massage therapy can constitute an equally important treatment tool for these patients, and offers a completely different approach to somatic rehabilitation. **Indeed, evidence suggests that several sessions of massage therapy renders the latter much more effective.**

The goal of massage treatment is to address the soft tissue of the thoracic cage layer by layer, and thus to eliminate tension built up in the respiratory muscles and fascia separately. An equally important component of the treatment protocol I employ is the detecting and gradually eliminating trigger points and hypertonus developed in the respiratory muscles due to the patient's chronic pulmonary disorder.

The following is a list of methods and techniques which are used to assist in the normalization of the respiratory function of patients with chronic respiratory abnormalities, and a short description of the mechanism of their therapeutic effect:

 Full-body Therapeutic Massage (TM) in the stimulating regime activates the sympathetic division of the autonomic nervous system and reduces parasympathetic tone supporting the bronchodilation.

 Segment-Reflex Massage (SRM) developed by two German physicians, O. Glezer, MD and V. A. Dalicho, MD helps to stimulate respiratory function using viscero-somatic reflexes in areas of the skin, fascia, skeletal muscles and periosteum receiving their innervation from the same segments of the spinal cord as the lungs. SRM helps to de-facilitate these segments.

 The Neuromuscular Therapy (NT) developed by British physician Dr.L. Chaitow, DO has similar approach to the somatic rehabilitation of the patients with the chronic pulmonary disorders as a SRM.

 Asymmetric Segment-Reflex Massage (ASRM) developed by Russian Physician O. F. Kuznetsov, MD is a great clinical tool in helping patients with chronic bronchitis and emphysema. As a result of chronic coughing or difficulty in breathing, tension builds up on the opposite (unaffected) side of the thoracic cage. ASRM allows the practitioner to eliminate imbalances between the respiratory muscles on both sides of the thoracic cage, to support the excursion of ribs, and to restore elastic recoil during exhalation. As a result, the thoracic cage regains its ability, during inhalation, to expand equally on both sides.

 Various percussion, vibration and compression techniques (e.g., Prilutsky's technique, respiratory stabilization technique, etc.), which allow to effectively drain the bronchial tree and eliminate mucous plugs in the small-caliber bronchi and bronchioles and restore proper ventilation of the lungs.

All patients with respiratory abnormalities who were treated with the specially designed course of massage therapy noticed significant improvements in their respiration and, as you may read in this brochure, this subjective sensation was supported by physical changes in the respiratory function detected by the authors of the cited articles, using sophisticated tests and diagnostic equipment capable of examining the impact of massage therapy on respiratory function.

This short brochure will review a small number of the relevant articles published in medical journals. All authors of the sources cited are physicians who studied the therapeutic effects of massage therapy on the respiratory function of healthy subjects as well as of patients with chronic pulmonary disorders.

EXPERIMENTAL STUDIES

The first experimental studies in this area were conducted at the end of the 19th and beginning of the 20th centuries. In 1904, the German Physician Dr. A. S. Eccles reported that massage strokes, especially manual percussion, applied to the thoracic cage of dogs' increased respiratory rate and supported respiration.

1. Emelyanova, T. M. The Effect of Various Massage Techniques on the Respiratory Rate. Experimental Study. Exper Med 3:18-21, 1968.

   The author conducted an experimental study on dogs to estimate the impact of massage on the respiratory rate. The largest increase in respiratory rate was detected after stimulating massage techniques (i.e., percussion, vibration, shaking) were applied along the intercostal spaces.

2. Komarova, L. A. The Effect of Massage on Pulmonary Function. Vrach Delo 7:41-46, 1969.

   The author examined the effect of massage therapy on pulmonary function in healthy adults. A 30-minute massage was performed on the thoracic cage of 16 healthy volunteers. Maximum Voluntary Ventilation was registered before and after the massage session. The author registered increases in MVV of up to 24.2% following the massage session.

3. Barr, J. S., Taslitz, N. The Influence of Back Massage on Autonomic Functions. Physical Therapy 50 (12):1679-1691, 1970.

   The authors of this article registered an increase in pulmonary ventilation after 20 minutes of back massage on 10 healthy females. The authors explained this increase as having resulted from stimulation of the sympathetic part of the autonomic nervous system, which triggered reflex bronchodilation and allowed freer air passage and an increased volume of air in the lung.

4. Chopra, S. K., Taplin, G. V., Simmons, D. H., Robinson, G. D., Elam, D., Coulson, A. Effect of Hydration and Physical Therapy on Tracheal Transport Velocity (TTV). Am Rev Respiratory Dis 15:1009-1014, 1977.

The authors conducted an experimental study on anesthetized dogs to examine the effect of hydration, massage and postural drainage on tracheal transport velocity (TTV). The authors measured TTV using a gamma scintillation camera. They placed protein microspheres labeled with radioisotopes Tc-99m at the lower end of the trachea and registered the speed of their movement up to the larynx by tracheal ciliary activity. These measurements were conducted before and after applied physical factors. The experimental study showed that TTV increased: after hydration, up to 4.91 mm/min; after postural drainage, up to 7.7 mm/min; after 10 min of manual percussion and vibration, up to 8.2 mm/min; and after a combination of massage strokes and postural drainage, up to 9.5 mm/min. The increased TTV created optimal conditions for the cleaning of the bronchial tree and the drainage of sputum from the lungs, with the best treatment being a combination of percussion and vibration over the thoracic cage together with postural drainage.

5. Turin, A. M. Traditional and Non-Traditional Massage. Iscusstvo-CPB: St. Petersburg, 1992.

The author registered an increase in respiration rate of up to a 20% after massage session. The author offered the following explanation for this increase: massage strokes activate the local metabolism in the massaged area, and as a result, an increased amount of CO2 is produced in the massaged tissue and it changed the blood acid-base balance. The increase of the partial CO2 pressure in the blood activates central and peripheral chemoreceptors. The author also reported changes in the blood chemistry of the respiratory center in the brain stem with subsequent increase of the respiratory rate as a result of reflex compensatory reaction.

6. Dubrovsky, V. I., Dubrovsky, N. M. Medical Massage Manual, Chuvachia: Cheboksari, 1995.

Using pulmonography, the authors studied the changes in pulmonary ventilation after massage. They reported increases in pulmonary function owing not only to stimulation of the respiration rate but also to the opening of reserve alveoli and their involvement in respiration.

CLINICAL STUDIES

1. N. K. Stabrovsky, 1887. Quoted from: Sterngertz, A. E., Belava N. A. Massage for Adults and Children. Zdorovie: Kiev, 1992.

In 1887, N. K. Stabrovsky, MD, was among the first authors to report in a medical journal that massage stimulates the drainage of sputum from the lungs of patients with chronic bronchitis.

2. Sister Elizabeth: Sensory Stimulation Techniques. Am J Nursing 6692:281-286, 1966.

Sister Elizabeth showed that the application of strong compression and intense friction around the spinous process of the T1 and T2 vertebrae suppresses cough. She also used various sensory stimulation techniques to improve the breathing of patients with emphysema. The author recommended that the patient be positioned on all fours, and that work be conducted on the areas between the lower ribs and the iliac crests. In such a case, the practitioner is able to reduce tension and fatigue in both quadratus lumborum muscles, these muscles having been identified as the major driving forces of forced exhalation. According to the author, another important area for sensory stimulation in cases of chronic respiratory abnormalities is the external abdominal obliqus muscle.

3. Clark, S. M., Cochrane, G. M., Weber, B. Effect of Sputum on Pulmonary Function. Thorax 28:262, 1973.

The authors studied the effect of chest percussion and vibration on static and dynamic lung volumes as well as on the amount and rheological parameters of sputum in 23 patients with chronic bronchitis, bronchoectasis and cystic fibrosis. All patients had different degrees of airway obstruction. The results of this clinical study showed that airway resistance significantly decreased, and that drainage of sputum from the bronchial tree accelerated, after the chest treatment. These results allowed the authors to conclude that massage helps bronchial clearance and thereby improves the lungs' function in patients with pulmonary disorders.

4. Rham, Q. T., Peslin, R., Puchelle, E., Salmon, D., Caraux, G., Benis, A. M. Respiratory Function and Rheological Status of Bronchial Secretions Collected by Spontaneous Expectoration and after Massage. Bull Physiopathol Respir 9: 292, 1973.

The authors studied the respiratory function and rheological status of bronchial secretions collected before and after chest massage on 38 patients with chronic bronchitis. The authors founded that after treatment, the sputum was significantly less viscous; arterial PO2 and alveolar-arterial PO2 difference improved. The authors concluded that reducing the viscosity of sputum was one of the key components in effective treatment of patients with chronic bronchitis.

5. Kuznetsov, O. F. Massage in the Treatment of Patients with Chronic Pneumonia. Vopr Kurortol Fiziothe Lech Fiz Kult 1:40-42, 1978.

In a clinical study of 64 patients with chronic pneumonia, Dr. Kuznetsov examined the effect of Asymmetric Segment-Reflex Massage (ASRM) on the respiratory function of these patients, when applied alone or in combination with bronchodilatory drugs. The patients were separated into two groups: the first group was treated with bronchodilatory and antibacterial drugs, and the second group was treated with a combination of the same medications and ASRM. The results of the treatment were examined by the testing of 7 ventilatory parameters:

respiratory rate, tidal volume, vital capacity, timed vital capacity, reserved volume, respiratory minute volume, and maximal voluntary ventilation. In the second group, all tests showed significant improvement as compared with those of the first group. The patients in both groups showed moderate hyperventilation. This clinical improvement in the first group was caused by increases in both the respiratory rate and the depth of respiration. By contrast, in the second group, the hyperventilation was caused by increases in the depth of respiration along with a simultaneous decrease of the respiratory rate by 6 respiratory cycles per minute. Thus, in the second group the same level of hyperventilation was achieved by more economic work of the respiratory muscles and diaphragm.

Finally, the author detected that in the second group, the bronchodilatory effect of medication (theophylline) was obtained quicker compared to the first group. Dr. Kuznetsov offered the following explanation for this phenomenon: massage, especially ASRM, normalizes the acid-base balance affected by the chronic pulmonary disorders. With the improvement of acid-base balance, the bronchodilatory medications quickly penetrate into the bronchial tree, triggering the bronchodilation. Similar increase of the potency of the bronchodilatory medications was reported earlier by Dr. V.K. Moshkov (Moshkov, V. K. Massage for Inner Organs Disorders. Medicina: Moscow, 1982).

6. Kuznetsov, O. F., Kuznetsova, B. A. Mechanism of The Therapeutic Effects of Classical and Asymmetric Segment-Reflex Massage in Cases of Chronic Pulmonary Disorders. Vopr Kurortol Fiziother Lech Fiz Kult 3:52-54, 1981.

In this clinical study, the authors examined and compared the effect of therapeutic (TM) and asymmetric segment-reflex massage (ASRM) on patients with chronic pneumonia and bronchitis. The study was conducted on 67 patients who were separated into two groups. In the first group (32 patients), a daily 15-minute classical TM was performed on the thoracic cage. In the second group (35 patients), a 30-minute ASRM was performed 2 times per week. The authors examined the effect of both methods by evaluating the activity of the sympathetic adrenal system. For this purpose, urinary excretion of epinephrine, norepinephrine, as well as their precursors dopamine and DOPA, was tested using 7 different parameters. The authors registered the following changes: in the first group, after 5 to 6 sessions of TM, the excretion of norepinephrine decreased from 3.37 □ 1.0 ngr/ml to 0.81 □ 0.3 ngr/ml, while the excretion of DOPA did not change; in the second group, after 2 to 3 sessions of ASRM, the excretion of norepinephrine increased from 4.12 □ 0.91 ngr/ml to 34.3 □ 3.4 ngr/ml.

The results shown that TM inhibits the sympathetic-adrenal system (decreasing epinephrine and norepinephrine excretion) while preserving its potential (leaving the level of DOPA unchanged). In the contrary, ASRM stimulates the activity of the sympathetic-adrenal system (increasing epinephrine and norepinephrine excretion), and what is more important, increases its reserve potential (the increasing of the DOPA excretion). After careful evaluation of these and other parameters, the authors issued the following recommendations for the treatment of respiratory

disorders by massage therapy. TM ought to be applied to every relapse case of chronic respiratory disorder. In such patients, the sympathetic-adrenal system is more active, rendering the clinical picture significantly worse. TM is able to inhibit the sympathetic-adrenal system. For patients exhibiting long-lasting chronic respiratory pathology during periods of remission, ASRM constitutes a major therapeutic priority, as it has a stimulating effect on the sympathetic-adrenal system, which usually shows signs of inhibition during periods of remission.

Regular application of this protocol of massage therapy prevents the acute reactivation of chronic pulmonary abnormalities. The two methods do not compete with each other, but rather should be combined for optimal clinical management of chronic pulmonary disorders.

7. Fedorovsky, L. S., Menchukov, O. N., Makarenko, O. N., Murashova, N. N. Influence of Massage on Pulmonary Ventilation and Gas Exchange Following Abdominal Surgery. Vopr Kurortol Fiziother Lech Fiz Kult 5:45-46, 1982.

The authors conducted a clinical study on 60 patients following upper abdominal surgery (cholecystectomy and partial gastrectomy). Up to 87 % of older patients after upper abdominal surgeries exhibit different abnormalities in respiratory function: restriction of the diaphragm and of thoracic cage excursion; insufficient bronchial drainage; hypoventilation; abnormalities of acid-base balance. These complications frequently cause pneumonia, complicating the patients' recovery. The authors examined the effect of massage therapy on respiratory abnormalities. Massage was performed daily for 6 to 10 minutes, starting on the day following the surgery, in the direction from the lower to the upper parts of the thoracic cage. The treatment was interrupted 1 to 2 times in order to allow the patient to cough and clean the bronchial tree of sputum. Several respiratory and lab tests were performed to fully analyze the impact of massage treatment. Following the treatment, the authors observed the following positive changes: a decrease in the respiratory rate by 5 to 6 breaths per minute, along with restoration of the normal depth of respiration; increases in tidal volume of up to 8%; increases in tidal capacity of up to 11%; increases in inspiratory reserve volume of 15-20%; and increases in capillary PO2 by 4-6 mmHg. All these positive changes were found to have significantly sped up the patients' recovery, as well as to have prevented such severe complications as pneumonia in all patients.

8. Beal, M. Viscerosomatic Reflexes: Review. JAOA 85(12):786-801, 1985.

The author recommended neuromuscular therapy for the treatment of somatic dysfunctions caused by bronchial asthma. The author recommended gentle initial pressure on all detected areas of viscero-somatic reflexes, followed by increased pressure after superficial spasm and tension were reduced.

9. Ebner, M. Connective Tissue Massage and Therapeutic Application. Kriger, Huntington: New York, 1975.

The author used connective tissue massage for the treatment of patients with dyspnea caused by chronic pulmonary disorders. The author reported that after

treatment, all patients began to breath more freely, deeply and regularly, with no visible difficulty. Similar effects were registered after segment-reflex massage (Glezer, O., Dalicho, V. A. Segmentmassage. Leipzig: 1955) and periostal massage (Vogler, P., Krauss, H. Periostbehandlung, Kolonbehandlung. Leipzig: 1975).

10. Kuznetsov, O. F., Kuznetsova, B. A. Classical and Asymmetric Segment-Reflex Massage in Cases of Chronic Pulmonary Disorder. Vopr Kurortol Fiziother Lech FizKult 5: 72-79, 1987.

The authors examined the effects of therapeutic (TM) and asymmetric segment-reflex massage (ASRM) on the acid-base balance of 64 patients with obstructive pulmonary disorders. All patients showed sighs of hypoventilation and therefore had different degrees of respiratory acidosis. After the course of ASRM, all patients showed improvement or complete restoration (in cases of moderate hypoventilation) of acid-base balance. PCO2: 39 □ 0.45 before the treatment (normal value = 7.40) as compared with 7.40 □ 0.005 two hours after the treatment. PCO2: 39 □ 0.45 before treatment (normal volume = 38) as compared with 36 □ 0.63 after treatment. PO2: 76 □ 0.63 before treatment (normal value = 80) as compared with 80 □ 0.84 after treatment. Based on the results of this study, the authors concluded that massage is able to: restore the acid-base balance by eliminating the excessive H+ via the lungs, increase blood oxygenation, and unload the kidneys. Considering the significance of the clinical results from therapeutic and asymmetric segment-reflex massage conducted on patients with chronic pulmonary abnormalities, the authors recommended these treatments as a must-component of every treatment protocol used in the management of pulmonary disorders.

11. Beecken, J. E., Parks, D., Cory, J., Montopoli, G. The Effectiveness of Neuromuscular Release Massage Therapy in 5 Individuals with Chronic Obstructive Lung Disease. Clin Nurs Res 7(3):309-325, 1998.

The authors examined the therapeutic impact of neuromuscular release massage on 5 patients with chronic obstructive lung disease (chronic bronchitis and emphysema). The authors measured 8 basic parameters of cardiac and pulmonary functions during the 24 weekly treatments. Four patients showed significant improvement with increases in thoracic gas volume, peak flow and forced vital capacity. Besides this, O2 saturation of the arterial blood as well as breath-holding time also significantly improved. The authors concluded that neuromuscular therapy improves pulmonary function, increases respiratory muscles strength, and improves the quality of life of patients with obstructive lung disorders.

12. Field, T. M. Massage Therapy Effects. Am Psych 53(12):1270-1281, 1988.

The author examined the effect of massage therapy on children with asthma. Patients in the clinical group (16 children) received regular treatment before bedtime for 30 days, delivered by their previously trained parents. The massage therapy include stroking and kneading techniques. Patients in the control group (16 patients) received progressive muscle relaxation therapy. The younger children (4 to 8 years old) of the clinical group showed the greatest improvements: the level of their anxiety decreased dramatically; significantly decreases in cortisol

levels was detected (from 1.2 to 0.8); forced vital capacity increased up to 24%; forced expiratory volume increased up to 27%; forced expiratory flow increased up to 57%; peak expiratory flow rate increased up to 30%. The older children (9 to 14 years old) of the clinical group also exhibited signs of decreased anxiety, but among the pulmonary tests, improvements in forced expiratory flow of up to 57% were registered. Thus, the authors concluded that daily massage normalizes the tone of the airways, decreases their irritability and significantly improves parents' and children's quality of life by better control of the asthma.

13. Zelenkin, E. M., Prozorovskaia, K. N., Mirkin, A. S., Zavgorodnaia, E. G., Kandaurova, A. N. Low-Frequency Vibration in the Treatment of Patients with Acute Maxillary Sinusitis and Ethmoiditis. Non-Specific Resistance and Immunity. Vest. Otorinolaringol 3:41-43, 1998.

The authors used low-frequency vibratory massage on patients with acute maxillary sinusitis alone, and acute maxillary sinusitis along with ethmoiditis. Vibratory massage was performed daily over the location of the maxillary and ethmoidal sinuses. Clinical and immunological evaluation of results showed a positive clinical progression in all patients, with complete elimination of inflamation in the cells of the ethmoidal labyrinth, as detected by X-ray. The authors emphasized the effectiveness of treatment, its low cost and simplicity (i.e., the fact that it can be applied by the patients themselves, at home).

14. Doering, T. J., Fieguth, H. G., Steuernagel, B., Brix, J., Konitzer, M., Schneider, B., Fisher, G. C. External Stimuli in the Form of Vibratory Massage after Heart or Lung Transplantation. Am J Phys Med Rehab 78(2):108-110, 1999.

The authors examined the effect of manual vibratory massage conducted on the thoracic cages of 8 patients in intensive care following coronary artery bypass surgery (2 subjects), heart transplantation (3 subjects), and lung transplantation (3 subjects). The authors found that percutaneous O2 saturation increased from 92% to 93.6%; central venous pressure decreased by 11%; the pulmonary vessels' resistance was reduced by 18.3%; pulmonary resistance decreased from 10.5 H2O/1/s to 9.2 H2O /1/s. After analyzing these data, the authors concluded that vibratory massage over the thorax improves respiratory function and lung perfusion by significantly decreasing the ventilation/perfusion mismatch which otherwise plays a negative role in the patients' recovery. The authors recommended manual vibration employing a frequency of between 8 and 11 oscillations per second.