

Osteopathic Lymphatic Pump Techniques

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Lymphatic pumps are gentle passive techniques that may be used on patients in both the inpatient and outpatient clinical settings. Pumps are used to facilitate fluid movement or immune responses in patients with varying symptoms and disease states. Somatic dysfunction affecting lymphatic flow may contribute to edema, impaired clearance of infection, and altered tissue healing and immune responses. In this article, we highlight key points regarding the lymphatic system and the role of lymphatic pump treatment (LPT) in clinical care.

The lymphatic system is a secondary circulatory system composed of a complex network of lymphatic channels, capillaries, nodes, plexes, tissues, and organs. This system serves to maintain homeostasis, support the immune response, and improve fluid balance.¹ It collects and filters fluid and proteins from interstitial tissue and absorbs and transports nutrients.¹

Lymphatic and venous flow is dependent on local mechanical and fluid forces as well as pressure differentials generated by muscular and diaphragmatic activity throughout the body. Large lymph vessels contain an intrinsic pump in the form of lymphangions, which are under autonomic control (both sympathetic and parasympathetic) and produce a peristaltic wave.¹ A larger-amplitude mechanical pumping is induced by muscle pumps, intrinsic visceral motion, and the rhythmic nature of respiration.¹ Breathing generates a pumping action as lymph and venous blood are drawn into the negatively pressured thoracic cavity from the positively pressured abdominal cavity during inhalation. However, somatic dysfunction may impede lymphatic flow via fascial compression of lymphatic vessels, increased impedance in the thoracic inlet region (the terminal drainage point), and increased sympathetic tone, which can alter peristalsis and valve motion.¹

Thoracic and pedal pump techniques (**video**) are 2 types of LPT that can be used to enhance the body's inherent physiologic pumping action. These pumping techniques have been demonstrated to increase lymphatic flow in the thoracic duct, and mechanical pumping has been shown to increase lymph uptake in rats.²⁻⁵ Furthermore, the application of LPT has been shown to boost antibody responses to vaccines (including pneumococcal and hepatitis B) and significantly increase secretory immunoglobulin A in a stressed population.⁶⁻⁸ Lymphatic pump techniques have also been shown to mobilize leukocytes from gut-associated lymphoid tissue, significantly increase leukocyte count, and mobilize inflammatory mediators such as interleukin 8, interleukin 6, interleukin 10, monocyte chemoattractant protein 1, granulocyte colony-stimulating factor, keratinocyte-derived chemoattractant, nitrite, and superoxide dismutase.^{4,5,9-13} When compared with levofloxacin plus sham treatment or levofloxacin alone given to rats infected with *Streptococcus pneumoniae*, the combination of LPT and levofloxacin was found to significantly reduce colony-forming units of *S pneumoniae* found in the lungs at 72 and 96 hours.¹⁴ In clinical practice, patients treated with the thoracic lymphatic pump after cholecystectomy were found to have an earlier recovery and a faster improvement of forced vital capacity than those treated with incentive spirometry.¹⁵

Lymphatic pump techniques are generally well tolerated; however, there are a few absolute contraindications, including anuria and necrotizing fasciitis. Contraindications are often related to concern regarding lymphatic spread of infection or malignant cells, dislodging a deep vein thrombosis, or causing fluid disbalance in a fluid-overloaded patient. Relative contraindications include treatment localized over an area that has cancer, fracture, or active infection; overwhelming bacterial

or chronic infections; coagulopathies; and unstable congestive heart failure.^{1,16} It is important to ensure that proximal lymphatic channels are opened before performing these techniques.

Lymphatic pump techniques can be easily and safely used in many patient presentations to enhance lymphatic fluid motion and improve immune function.

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References

1. Kuchera ML. Lymphatic approach. In: Chila AG, executive ed. *Foundations of Osteopathic Medicine*. 3rd ed. Baltimore, MD: Lippincott Williams & Wilkins; 2011:786-804.
2. Knott EM, Tune JD, Stoll ST, Downey HF. Increased lymphatic flow in the thoracic duct during manipulative intervention. *J Am Osteopath Assoc*. 2005;105(10):447-456.
3. Dery MA, Yonuschot T, Winterson BJ. The effects of manually applied intermittent pulsation pressure to rat ventral thorax on lymph transport. *Lymphology*. 2000;33(2):58-61.
4. Schander A, Padro D, King HH, Downey HF, Hodge LM. Lymphatic pump treatment repeatedly enhances the lymphatic and immune systems. *Lymphat Res Biol*. 2013;11(4):219-226. doi:10.1089/lrb.2012.0021
5. Hodge LM, Downey HF. Lymphatic pump treatment enhances the lymphatic and immune systems. *Exp Biol Med*. 2011;236(10):1109-1115. doi:10.1258/ebm.2011.011057
6. Saggio G, Docimo S, Pilc J, Norton J, Gilliar W. Impact of osteopathic manipulative treatment on secretory immunoglobulin A levels in a stressed population. *J Am Osteopath Assoc*. 2011;111(3):143-147.
7. Measel JW Jr. The effect of lymphatic pump on the immune response: I. Preliminary studies on the antibody response to pneumococcal polysaccharide assayed by bacterial agglutination and passive hemagglutination. *J Am Osteopath Assoc*. 1982;82(1):28-31.
8. Jackson KM, Steele TF, Dugan EP, Kukulka G, Blue W, Roberts A. Effect of lymphatic and splenic pump techniques on the antibody response to hepatitis B vaccine: a pilot study. *J Am Osteopath Assoc*. 1998;98(3):155-160.
9. Hodge LM, Bearden MK, Schander A, et al. Lymphatic pump treatment mobilizes leukocytes from the gut associated lymphoid tissue into lymph. *Lymphat Res Biol*. 2010;8(2):103-110.
10. Walkowski S, Singh M, Puertas J, Pate M, Goodrum K, Benencia F. Osteopathic manipulative therapy induces early plasma cytokine release and mobilization of a population of blood dendritic cells. *PLoS One*. 2014;9(3):e90132.
11. Schander A, Downey HF, Hodge LM. Lymphatic pump manipulation mobilizes inflammatory mediators into lymphatic circulation. *Exp Biol Med*. 2012;237(1):58-63.
12. Hodge LM, King HH, Williams AG Jr, et al. Abdominal lymphatic pump treatment increases leukocyte count and flux in thoracic duct lymph. *Lymphat Res Biol*. 2007;5(2):127-133.
13. Huff JB, Schander A, Downey HF, Hodge LM. Lymphatic pump treatment augments lymphatic flux of lymphocytes in rats. *Lymphat Res Biol*. 2010;8(4):183-187.
14. Hodge LM, Creasy C, Carter K, Orlowski A, Schander A, King HH. Lymphatic pump treatment as an adjunct to antibiotics for pneumonia in a rat model. *J Am Osteopath Assoc*. 2015;115(5):306-316.
15. Sleszynski SL, Kelso AF. Comparison of thoracic manipulation with incentive spirometry in preventing postoperative atelectasis. *J Am Osteopath Assoc*. 1993;93(8):834-838, 843-845.
16. Wallace E, McPartland JM, Jones JM III, Kuchera WA, Buser BR. Lymphatic system: lymphatic manipulative techniques. In: Ward RC, executive ed. *Foundations of Osteopathic Medicine*. 2nd ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2003:1068-1070.
17. Chikly BJ. Manual techniques addressing the lymphatic system: origins and development. *J Am Osteopath Assoc*. 2005;105(10):457-464.

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