

Lymphatic Complaints in the Dermatology Clinic: An Osteopathic Approach

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Abstract

The number of patients presenting to dermatologists with lymphatic complaints continues to grow, given our aging population and the increasing prevalence of predisposing chronic medical conditions. Sequelae may include pain, stasis skin changes, and chronic wounds. Lymphatic conditions impose a physical and psychological burden on patients, as well as a financial strain on both patients and the medical system. The medical community is in need of cost- and time-effective treatment measures. Osteopathic dermatologists are uniquely suited to meet this need through our training in osteopathic lymphatic manipulative treatment techniques. These techniques are suitable for use as primary or adjunct treatments for lymphatic dysfunction. However, in a busy dermatology clinic, lengthy osteopathic treatments are often seen as impractical. A five-minute osteopathic lymphatic manipulative treatment technique module has been developed for the management of lower extremity lymphatic complaints and is appropriate for use in the general dermatology clinic.

Definition and Epidemiology

Dermatologists are seeing an increasing number of patients who present with complaints related to lymphatic dysfunction. This is largely due to an aging U.S. population and the increasing prevalence of chronic medical issues which, either through their own natural history or due to the therapies required to treat them, predispose patients to acquired lymphatic dysfunction.

For example, an estimated 6 million to 12 million Americans suffer from peripheral vascular disease (PVD). Depending on the severity of their PVD, 30% to 80% of these individuals (approximately 2 million to 5.4 million people) will go on to suffer from resultant lymphedema.¹⁻⁴ Another common cause of acquired lymphatic dysfunction is surgical lymph node dissection (LND) performed in the course of cancer treatment. After LND, approximately 15% of patients go on to develop lymphedema. In patients undergoing inguinal or pelvic lymph node dissection, the incidence of resultant lymphedema may be as high as 40%.⁵

Presentation and Pathophysiology

Edema and lymphedema, while potentially similar in clinical presentations and possible sequelae, differ in epidemiology and pathophysiology. Edema is defined broadly as an excess of interstitial fluid that overwhelms lymphatic drainage capacity. It is not usually clinically apparent until the interstitial fluid volume has increased ~100% to a total volume of 2.5 L to 3 L.⁶ In order for edema to occur, one or more alterations in physiologic Starling forces must occur (see **Table 1**). Any combination of alterations in the Starling factors may result in a quicker or more severe presentation.

In contrast to edema, which is largely a secondary result of primary physiologic changes, lymphedema is a true failure of the lymphatic system, causing drainage capacity to fall below normal. Lymphedema is divided into two groups, primary and secondary, based on the etiology of the disorder (see **Table 2**).

Lymphedema can be distinguished from edema by (1) causative factors, (2) a duration of greater

than three months or (3) clinical characteristics of lymphedema such as *peau d'orange* or woody appearance of the skin and severely limited or absent pitting (see **Table 3**).

In the developed world, lymphedema is most commonly seen after surgical treatment for a malignancy, a classic example being upper extremity lymphedema secondary to surgical

lymph node dissection during diagnosis of breast cancer. Lymphedema may also be seen after severe or prolonged cellulitis. Worldwide, filariasis (caused by *Wuchereria bancrofti* or *Brugia malayi*) is the most common cause of secondary lymphedema.¹⁰

Treatment

Table 1. Derangements in Starling forces: physiologic and medical causes of edema.⁹

Increased capillary hydraulic pressure
Renal sodium retention
Heart failure
Renal sodium retention: renal failure, drugs, refeeding syndrome, cirrhosis
Pregnancy
Sodium or fluid overload
Venous obstruction
Cirrhosis
Acute pulmonary edema
Local venous obstruction (e.g., DVT)
Due to vasodilation, as in lower extremity venous dysfunction
Increased capillary permeability
Diabetes mellitus
Burns
Hypersensitivity reactions
Sepsis or inflammation
Malnutrition
Envenomation
Increased interstitial oncotic pressure
Lymph node dissection
Hypothyroidism
Malignant ascites
Decreased plasma oncotic pressure
Liver disease
Malnutrition
Nephrotic syndrome
Protein-losing enteropathy

Table 2. Causes of primary and secondary lymphedema^{7,8}

PRIMARY LYMPHEDEMA	SECONDARY LYMPHEDEMA
<i>Primary lymphedema is due to inborn aplasia, malformation, or other dysfunction of lymphatics.</i>	<i>Secondary lymphedema is caused by an acquired defect in the lymphatic system.</i>
<p>SPORADIC:</p> <ul style="list-style-type: none"> • The most common type of primary lymphedema. • May occur as a feature of other sporadic syndromes, e.g., Klippel-Trenaunay syndrome <p>CONGENITAL:</p> <ul style="list-style-type: none"> • Milroy’s disease – FLT4/VEGFR3 mutation • Lymphedema-distichiasis syndrome – FFOX2 mutation <ul style="list-style-type: none"> ◦ Delayed onset (postpubertal) <p>FAMILIAL:</p> <ul style="list-style-type: none"> • 5-10% of all primary lymphedema • Meige’s disease <p>AS A FEATURE OF OTHER INHERITED SYNDROMES:</p> <ul style="list-style-type: none"> • Turner syndrome – karyotype 45,X • Noonan syndrome – PTPN11 mutation • Proteus syndrome – AKT1 mutation • Aagenaes (cholestasis-lymphedema) syndrome • Hennekam (lymphangiectasia-lymphedema) syndrome <ul style="list-style-type: none"> ◦ Type I – CCBE1 mutation ◦ Type II – FAT4 mutation • Hypotrichosis-lymphedema-telangiectasia syndrome – SOX18 mutation • Microcephaly-lymphedema-chorioretinal dysplasia – KIF11 mutation 	<p>CAUSES:</p> <ul style="list-style-type: none"> • Filariasis • Malignancy and cancer treatment • Morbid obesity • Trauma • Peripheral vascular dysfunction or surgery • Congestive heart failure • Burns • Recurrent infections • Portal hypertension

Table 3. Clinical characteristics of edema and lymphedema.^{22,23}

Lymphedema	Edema
Duration > 3 months	Duration < 3 months
Hyperkeratosis and tissue fibrosis: hardened, hyperpigmented subcutis → <i>peau d’orange</i> or woody appearance of the skin	Generally normal-appearing epidermis; hyperpigmentation may be present
Non-pitting or severely limited pitting	Pitting

Lymphedema and edema treatment regimens focus largely on modifying physiologic factors either responsible for (in edema) or complicating (in lymphedema) lymphatic dysfunction. In milder cases of edema, lifestyle changes are often recommended. These simple adjustments, made by patients in their own day-to-day lives, may play a large role in ameliorating lymphatic dysfunction. Common interventions include weight loss, increasing daily exercise, and elevating edematous extremities when at rest. These and other, similar lifestyle adjustments can improve fluid return to the heart and significantly decrease lymphatic congestion.

In many cases of edema, first-line therapy focuses on treating an underlying medical condition. For example, in heart failure patients, interventions might include a low-salt diet and oral diuretic therapy. For patients with end-stage renal dysfunction or other fluid overload, dialysis is critical. For burn or septic patients, therapy focuses on treatment of the primary medical condition and resulting systemic inflammatory response syndrome. Similarly, for patients with edema caused by cirrhosis or deep vein

thromboses, medical treatment of the underlying condition often significantly improves or even resolves coexisting edema.

In cases of inherited or iatrogenic lymphatic dysfunction, or in those cases of edema that persist despite lifestyle changes and medical treatment, consistent use of compression stockings is a critical part of therapy. Specially-trained physical therapists may prescribe patients a specific set of exercises shown to improve lymphatic flow. Physical therapists may also treat patients with manual lymphatic drainage, or MLD. When compression stockings are used concurrently with MLD, the combination is known as decongestive lymphatic therapy (DLT).¹¹

Osteopathic Perspective

Both edema and lymphedema may have significant sequelae including pain, skin changes, vascular complications, and chronic wounds – all of which are common complaints in the dermatology clinic. These sequelae pose not just a physical and psychological burden to patients, but also a financial stress on both the patient and the U.S. medical system. In fact, in the United

States, an estimated \$25 billion is spent each year on the treatment of chronic wounds alone.³

Given the increasing prevalence and cost of lymphatic dysfunction both in the country and the dermatology clinic, there is a need for cost- and time-effective treatments. Lymphatic osteopathic manipulative treatment (OMT) techniques are very similar to those utilized by physical therapists trained in MLD and DLT. OMT lymphatic techniques are taught in every U.S. college of osteopathic medicine, making osteopathic dermatologists uniquely suited to address the growing challenge of lymphatic dysfunction.¹² Various osteopathic manipulative treatment techniques have been shown useful in the practice of dermatology; however, undertaking lengthy lymphatic osteopathic manipulative treatments in a busy dermatology clinic is rarely considered realistic.^{13,14} Furthermore, and perhaps more troubling, in recent original research, only 5% of surveyed osteopathic medical students felt that osteopathic manipulative treatment techniques had utility in the lymphatic and vascular domains of clinical dermatologic care.¹⁵

Osteopathic manipulative treatment of lymphatic

dysfunction fits best into the respiratory-circulatory model of osteopathic principles and practices, which emphasizes normalization of a patient's pulmonary and cardiovascular functions as well as the circulation of fluids such as blood, lymph, and cerebrospinal fluid. Specifically, here we focus the application of this osteopathic model on the physiologic movement of vital fluids through the vascular and lymphatic systems, the flow of which can be impeded by restrictions in the transverse diaphragms of the body. These diaphragms include the cerebellar tentorium, the thoracic inlet, the respiratory/abdominal diaphragm, the pelvic diaphragm, and the popliteal fossa.^{16,17}

Osteopathic Manipulative Treatment

The authors describe a brief yet comprehensive lymphatic osteopathic manipulative treatment module, conducive to completion in a typical clinical exam room. The patient remains supine for the entirety of the module, eliminating the time and effort spent having a patient transition between several different positions during treatment. This treatment protocol is designed to be completed in five to 10 minutes, making it well-suited even for busier clinics.

In this setting, the goal of using OMT is two-pronged: first, to decrease restriction in the transverse diaphragms of the body, and second, to utilize active and/or passive oscillatory movements to encourage mobilization of lymphatic fluid from peripheral tissues and return it to the heart.

In this treatment module, the majority of the osteopathic manipulative treatment techniques utilized to modulate transverse physiologic diaphragms are myofascial release (MFR) maneuvers. The Educational Council on Osteopathic Principles defines MFR as "a system of diagnosis and treatment first described by Andrew Taylor Still and his early students, which engages continual palpatory feedback to achieve release of myofascial tissues." MFR techniques have also been defined as those "designed to stretch and reflexively release patterned soft tissue and joint-related restrictions."¹⁹

MFR can be performed as a direct or an indirect technique. Direct techniques are those in which the restrictive barrier is engaged and a final clinician-directed force is applied in order to correct somatic dysfunction. Indirect techniques are those in which the restrictive barrier is disengaged and the dysfunctional structure moved away until tension is normalized and equal in all planes of movement. Other osteopathic manipulative treatment techniques utilized in this module are of the oscillatory lymphatic type. These techniques involve passive mechanical movements, undertaken by the physician, intended to remobilize the patient's peripheral lymphatic fluid and encourage recirculation thereof.¹⁸⁻²¹

In order to most successfully decrease peripheral edema, osteopathic manipulative treatment techniques aimed at reducing transverse diaphragm restriction should be completed in a cephalad to caudad progression. This approach

first reopens proximal lymphatic pathways, allowing fluid mobilized distally to follow an unimpeded path of return to the heart.

The thoracic outlet is an anatomic space created by the boundaries of the first thoracic vertebra (T1), the first ribs, the costal cartilage of the first ribs, and the superior manubrium. If the physiologic function of the outlet is impeded, it can prevent effective return to central circulation of lymphatic fluid from both the upper extremities and the lower body. In order to ensure lymph returning from the peripheral body has a clear pathway to the circulatory system, the MFR thoracic inlet release technique should be performed. It may be undertaken as a direct or an indirect technique, first by placing the physician's hands over the thoracic inlet with the thumbs on the transverse process of T2 and the head of the 2nd rib, and the fourth and fifth fingers between the clavicle and the first rib. Thoracic inlet tissues should be moved in the direction of restriction (direct) or of ease (indirect) until an inherent release in the tissues is felt. The physician may also modify the technique into a more active form by following release through patient exhalations (**Figure 1**).

In order to encourage return of lymphatic fluid from the thorax, the oscillatory lymphatic Miller Pump is utilized. There are several variations on the performance of this technique, the most basic of which involves the physician placing hands on the patient's thoracic wall, fingers spread, with the thenar eminence just distal to clavicle. The patient turns his or her head to the side. As the patient breathes in and out, an oscillatory pressure is applied to the ribcage throughout the respiratory cycle (**Figure 2**).

In order to ensure that lymphatic fluid mobilized from the lower extremities can return cephalad, physiologic function of the transverse abdominal diaphragm can be restored via redoming. In this technique, the physician grasps the patient's abdomen with thumbs beneath the inferior costal margins. The physician then asks the patient to breathe in; as the diaphragm descends, inferior motion is resisted. As the patient breathes out, the diaphragm's cephalad motion is augmented until a tissue release is felt. The physician repeats this technique, advancing laterally along the inferior costal margins for several cycles to treat the entire anterolateral respiratory diaphragm (**Figure 3**).

The pelvic outlet is an anatomic space created by the borders of the pubic arch, the ischial tuberosities, the inferior margin of the sacrotuberous ligament, and the tip of the coccyx. The pelvic floor is made up of the levator ani and coccygeus muscles and their associated connective tissue. It spans the area underneath the pelvis and is another transverse diaphragm that, if restricted, can impede peripheral lymphatic fluid return to central circulation. To restore proper physiologic function to the pelvic outlet and floor, MFR techniques can be employed. Ordinarily, the innominate move more easily in opposing directions. The physician contacts both of the patient's iliac crests with his or her hands, simultaneously assessing position and motion of



Figure 1. Thoracic inlet release (MFR)



Figure 2. Miller thoracic pump (oscillatory lymphatic)



Figure 3. Redoming the abdominal diaphragm (MFR)



Figure 4. Pelvic floor and pelvic outlet (MFR)

the crests in a transverse plane. The physician positions both innominates in the direction of freer motion, balancing both sides; this position is held until a release is felt. Motion of the iliac crests is then reassessed for appropriately balanced reciprocal motion (Figure 4).

The lower extremities are common sites of lymphatic somatic dysfunction. Aside from physiologic factors, gravity also encourages lymph pooling in the feet and distal legs. Lymph return from the lower extremities can be improved in two steps: first, by encouraging effective lymph passage cephalad by relieving restriction in the popliteal fossae; and second, by inducing cephalad motion of pooled peripheral lymph via physician-induced oscillatory motion. Popliteal spread is an MFR technique in which the physician bends the supine patient's knee to approximately 90 degrees. The physician may place the patient's foot between the physician's knees or legs for support. The physician places his or her finger pads in the patient's popliteal space, applying a direct fascial spread until a release of the tissues is felt (Figures 5a, 5b).

To encourage lymphatic return to the heart, the oscillatory lymphatic pedal pump technique is employed. This technique can be utilized by inducing dorsiflexion or plantarflexion of the patient's feet; the two motions may also be employed one after another for enhanced lymphatic mobilization. The physician grasps the patient's feet with the palms contacting the MTP area of the soles. Dorsiflexion is induced, stretching the posterior body wall fascia. The physician introduces a quick further cephalad force, then releases it. This force sends a wave of tissue and therefore fluid motion cephalad, followed by a caudal rebound wave. As the rebound wave reaches the patient's feet, the physician induces another dorsiflexion force. Frequency is therefore tailored to the patient, but it generally falls within the range of 80 to 120 per minute. The duration of this treatment should be one to two minutes (Figure 6).

Contraindications

The efficacy of lymphatic techniques has been documented in the scientific literature, and to date no significant complications resulting from lymphatic osteopathic manipulative treatment have been reported. Therefore, the risk-to-benefit ratio for the performance of lymphatic OMT is quite good, and the majority of contraindications – absolute or relative – are theoretical in nature.¹⁹

Contraindications to lymphatic OMT are often summed up by the acronym "RIFT": radiculopathy, infection (abscess in area being treated or a systemic infection with temperature greater than 102°F), osseous fracture, or tumor. Anuric patients who are not being dialyzed and patients with necrotizing fasciitis should not be treated with lymphatic OMT. Patients with systemic coagulopathies should be treated with caution, and patients with a localized coagulopathy (embolus, deep vein thrombosis) should not be treated with lymphatic OMT.^{13,19,24-25}

The use of OMT in patients with malignancies is controversial. There is a question of whether lymphatic OMT could mobilize malignant cells, encouraging metastasis. The alternate school of thought maintains that lymphatic OMT might enhance delivery of malignant cells to the immune system, enhancing recognition and destruction. Deleterious effects secondary to the use of lymphatic OMT in patients with malignancies have not been documented; however, there is a dearth of scientific studies on the topic. Thus, these techniques should be used at the discretion of the practicing physician.^{19,25}

In the past, some have questioned whether the use of lymphatic OMT in patients with congestive heart failure (CHF) or other causes of decreased cardiac output could result in central fluid overload and cardiovascular collapse. This concern is not supported by the literature. *In vivo* studies on terminal CHF patients showed cardiovascular stabilization after performance of thoracovenous shunting, which mimics the hemodynamic changes anticipated after performance of lymphatic OMT.²⁶ Furthermore, *in vivo* studies in canines have shown that cardiac output and heart rate, though increased during physical activity, did not change significantly during or after the use of lymphatic osteopathic manipulative techniques.²⁷ Lymphatic OMT has also been used with excellent results in coronary artery bypass graft (CABG) surgery patients during the immediate post-operative period. As compared to non-OMT-treated post-CABG control subjects, post-CABG patients treated with lymphatic OMT experienced statistically significant differences in decreased central blood volume (suggesting improved peripheral circulation), increased venous oxygen saturation, and improved cardiac index.²⁸ Thus, the use of lymphatic OMT in patients with CHF -- even if severe -- does not likely pose a risk of fluid overload, and, in fact, likely encourages hemodynamic stabilization.^{19,24-29}

Conclusion

Lymphatic dysfunction is a condition with serious medical, psychological, and financial implications. Its prevalence continues to rise within the United States and throughout the world. Because lymphatic dysfunction often results in skin-related sequelae, dermatologists see many patients with lymphatic complaints and secondary complications. Due to our training in lymphatic osteopathic treatment and our dedication to holistic care of our patients, osteopathic dermatologists and all osteopathic physicians are uniquely equipped to treat patients with lymphatic dysfunction. This module presents a comprehensive, effective means by which osteopathic physicians can treat patients with lymphatic complaints as a part of a routine office visit. In this way, osteopathic physicians not only improve our patients' quality of life, but also play an important role in decreasing the morbidity and health care costs associated with lymphatic dysfunction.



Figure 5a

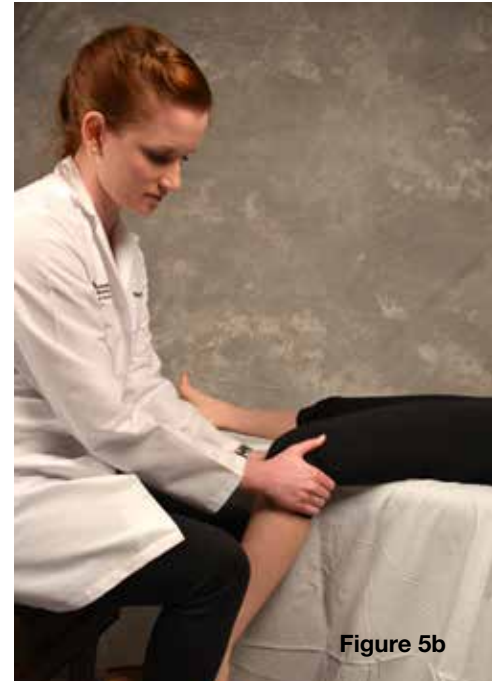


Figure 5b

Figure 5a – 5b. Popliteal spread (MFR)



Figure 6. Pedal pump (oscillatory lymphatic)

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