

## Manual Techniques Addressing the Lymphatic System: Origins and Development

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Numerous articles have been published describing the scientific discovery of the lymphatic system, but few of these articles have focused on the origin and development of manual techniques addressing this complex system of vessels, valves, nodes, and organs.<sup>1</sup> These manual techniques—like knowledge about the lymphatic system itself—evolved late in the history of medicine.

Early civilizations did not make a clear distinction between lymph and blood. Nevertheless, some of these civilizations, notably those in Sumer and Babylonia (both in modern-day Iraq), Egypt, India, and China, had elementary notions of a “white blood.”<sup>2</sup> This substance may have been chyle, the post-prandial whitish lymph that carries lipids of the alimentary tract.<sup>2</sup>

The ancient Greeks also observed some elements of the lymphatic system, most likely the lacteals, the milky lymph vessels that carry chyle.<sup>3</sup> In addition, they probably observed the thoracic duct in animals.<sup>3</sup> However, like other early civilizations, the Greeks failed to clearly differentiate lymph from blood. Therefore, it is highly unlikely that manual lymphatic techniques would have arisen in these civilizations.

It was not until the 1600s that investigators clearly identified the lymphatic system. The Italian surgeon and anatomist Gasparo Aselli published the first scientific description of the lacteal vessels in dogs in 1622.<sup>4</sup> The Swedish anatomist Olof Rudbeck demonstrated the passage of the lymphatic vessels of the mesentery into the ductus thoracicus in the 1650s, proving that lymphatic circulation is an integrated system that is separate from blood circulation.<sup>5</sup>

As knowledge of the lymphatic system began to grow, so did interest in combining therapeutic techniques with body movement—though, for many years, researchers made no connection between body movement and the lymphatic system. At the beginning of the 19th century, German physical

educator Johann Guts Muths developed a system of therapeutic gymnastics designed to maintain physical condition and health.<sup>6</sup> He was soon followed by fellow German physical educator Friedrich Ludwig Jahn, who created a gymnastics system called *turnen*, which can be roughly translated as “movement.”<sup>7</sup>

Also during the early 1800s, Pehr Henrik Ling, a Swedish instructor of gymnastics, used anatomic and physiologic principles to restructure the gymnastics system developed by Muths. Ling developed the system of massage and rhythmic movement called the “Sweden movement treatment,” also referred to as “medical gymnastics” or the “Ling system.”<sup>8</sup>

Ling suffered from chronic health problems, including rheumatism. He discovered that his daily regimen of exercise and manual therapy had a beneficial effect on his health. In 1804, Ling established himself in Lund, Sweden, as both a fencing master and teacher of medical gymnastics.<sup>9</sup> In 1813, the Royal Gymnastic Central Institute (now the College of Physical Education) in Stockholm, Sweden, adopted his method, and in 1831, Ling was elected as a member of the Swedish General Medical Association, the main professional organization for medical practitioners in Sweden.<sup>8</sup> Today, Ling is known as the father of modern massage and physical therapy.

In 1851 in England, Mathias Roth, MD, published the first book written in English on the Ling system.<sup>10</sup> Dr Roth trained Charles Fayette Taylor, MD, from New York, who introduced the Ling system in the United States in 1858 with the help of his older brother, George H. Taylor, MD.<sup>10</sup> Dr George Taylor wrote the first American book on the Ling system, *Exposition of the Swedish Movement Cure*, in 1860.<sup>11</sup>

The Ling system of medical gymnastics consisted of (1) the hygienic aspect, which combined muscle strengthening with general physical education, and (2) the medical aspect, which focused on cures for physical ailments.<sup>8,11</sup> The system used both active and passive motion. The practitioner-induced passive motion, now widely known as Swedish massage, consisted of the application of pressure in long, firm motions along muscles, as well as clapping, cupping, effleurage, friction, pétrissage, tapotement, and vibration.<sup>8,11</sup>

None of the manual techniques developed by Ling specifically addressed the lymphatic system, however. In fact, many of the Ling techniques may be contraindicated for patients with edematous conditions, as suggested by recent research by Eliska and Eliskova<sup>12</sup>, who found that peripheral lymphatics

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## SPECIAL COMMUNICATION

are damaged by high-pressure massage. In their study, Eliska and Eliskova exerted pressures of 70–100 mm Hg for periods of 1, 3, 5, and 10 minutes to both canine subjects (n=4) and human subjects (n=2).<sup>12</sup> The researchers detected destruction of lymphatic vessels in skin biopsies, especially in cases of lymphedema and chronic postthrombotic venous edema.<sup>12</sup> The researchers also found that high-pressure massage caused some destruction of lymphatic vessels in nonedematous canine subjects (n=8) and human subjects (n=6).

### Andrew Taylor Still's Influences on Lymphatic Techniques

Andrew Taylor Still, MD, DO (Figure 1), announced the tenets of osteopathic medicine in 1874. Armed with a profound knowledge of human anatomy and physiology, Dr Still developed a medical system designed to facilitate natural healing processes by finding and correcting anatomical deviations that interfere with the free flow of blood and lymph and with the so-called “nerve force” in the body.<sup>13</sup>

Although European traditions influenced health and fitness in the United States from the early to middle 19th century, Dr Still developed his tenets with no influence from the European techniques of Ling or other practitioners of medical gymnastics. However, Dr Still did critically evaluate several other medical theories that were then being investigated, such as bonesetting, eclecticism, Grahamism, homeopathy, hydropathy, and magnetic healing.<sup>13</sup> These evaluations helped Dr Still separate more effective from less effective techniques as he developed his original system of healing. In 1892, after achieving great success with his manual techniques, Dr Still founded the American School of Osteopathy (ASO), now called the Kirksville College of Osteopathic Medicine of A.T. Still University of Health Sciences in Missouri.

Dr Still created a multidimensional approach to manual medicine, in which for the first time, the lymphatic system held an important place—though for him the lymphatics were still a “mystery to solve.”<sup>14,15</sup> Dr Still admitted, “Possibly less is known of the lymphatics than any other division of the life-sustaining machinery of man.”<sup>16,17</sup>

When asked about the “eternal truths” of osteopathy, Dr Still responded, “[Those truths] are found in the spinal column with all of its intricate bony framework, plus the beautiful circulation of blood and lymph through the nerve centers of the spinal cord and throughout the whole body.”<sup>18</sup>

The lymphatic system is a vital system of the body that must not be neglected, emphasized Dr Still, who wrote, “We lay much stress on the uses of blood and the powers of the

nerves, but have we any evidence that they are of more vital importance than the lymphatics? ... the system of the lymphatics is complete and universal in the whole body.”<sup>16,17</sup> He also wrote, “We are admonished in all our treatment not to wound the lymphatics, as they are undoubtedly the life giving centers and organs. Thus it behooves us to handle them with wisdom and tenderness ... your patient had better save his

life and money by passing you by as a failure, until you are by knowledge qualified to deal with the lymphatics.”<sup>14,15</sup> In addition, he stressed, anything that is retained in the lymphatics longer than necessary results in “fermentation, fever, sickness and death.”<sup>15,19</sup>

Dr Still even speculated on a relationship between lymph and the reabsorption of cerebrospinal fluid. He wrote, “The lymphatics are closely and universally connected with the spinal cord and all other nerves, long or short, universal or separate, and all drink from the waters of the brain.”<sup>14,15</sup> This proposed relationship, in which cerebrospinal fluid is reabsorbed by the lymph, has been supported by recent research.<sup>20</sup>

Dr Still did not emphasize descriptions of his techniques of osteopathic manipulative treatment (OMT) in his writings. Although he did discuss a

number of his techniques in *The Philosophy and Mechanical Principles of Osteopathy*,<sup>16</sup> he had copies of this book recalled for fear that people would use it as a “how-to” manual (J.L. Dickey, DO, oral communication, October 2005). The book was republished in 1986 by Osteopathic Enterprise of Kirksville, Mo. Rather than advocate specific osteopathic manipulative (OM) techniques, Dr Still expected osteopathic physicians to use their extensive knowledge of anatomy and physiology and their clinical experience to find the best osteopathic approach for each patient. Nevertheless, several descriptions of Dr Still's lymphatic techniques can be found indirectly in the osteopathic medical literature.<sup>18,21,22</sup>

A description of one technique attributed to Dr Still is found in an undated article by Charles F. Haverlin, DO,<sup>21</sup> a student of Dr Still's. The article, which purports to describe “original osteopathic moves as taught by Doctor Andrew Taylor Still,” contains the following account:

To drain cervical lymphatics stand on the right side of the patient, in dorsal position, place the left hand on the forehead, and with the right hand reach over the sternocleidomastoid muscle, draw the muscles up closely around the chin, with pressure on parotid and sub-mental gland, turn the head away gently with the left hand, and continue this movement downward, one vertebra at a time, to the seventh cervical.<sup>21</sup>



**Figure 1.** Andrew Taylor Still, MD, DO, first proposed the tenets of osteopathic medicine in 1874. Image courtesy of Still National Osteopathic Museum, Kirksville, Mo.

A member of the charter class at ASO and a longtime disciple of Dr Still's, Arthur G. Hildreth, DO,<sup>15</sup> attributes another treatment to Dr Still, reporting on a manual technique that Still may have used in the late 1870s or early 1880s. A patient "noticed a lump on her neck just below the angle of the jaw on the left side," wrote Dr Hildreth.<sup>18</sup> Dr Still concluded that the lump must have been an enlarged gland or lymph node. Dr Hildreth<sup>18</sup> continued:

[The patient] finally called on Dr Still. He examined her and told her he could take the lump away and [he] began treating it by manipulation of the neck and then later on by manipulation of the gland itself ... She was treated by Dr Still once or twice a week for three months, at the end of which time the growth had disappeared entirely.

George W. Riley, DO, the 1917–1918 president of the American Osteopathic Association, related another manual technique used by Dr Still. According to Dr Riley:

When congestion of the respiratory system was being considered ... passing his hands over the shoulders and under the axillae [Dr Still] would say, 'Don't fail to free up the circulation of the blood and lymph in these areas.' Indeed the lymph and the importance of its unobstructed flow [were] accentuated by him almost on a par with that of the blood.<sup>18</sup>

Yet another lymphatic technique that may have been utilized by Dr Still was described and demonstrated by E. Tracy Parker, DO,<sup>22</sup> at an osteopathic medical conference in Toronto, Ontario, in 1934. Dr Parker demonstrated a technique of lymph pumping that he had been using since 1925. It required that an osteopathic physician place one of his or her feet in the axilla while the patient is lying in the supine position. Dr Parker reported after the demonstration, "I had three men tell me afterward that they had seen Dr A.T. Still do the same thing."<sup>22</sup>

### Early Advancement of Dr Still's Lymphatic Techniques

Elmer D. Barber, DO, who graduated from ASO's second class, published the first book on osteopathic medicine, *Osteopathy Complete*, in 1898.<sup>19</sup> Dr Barber's book contained one of the first published descriptions of a manual technique specifically attempting to "free the lymphatic circulation."<sup>23</sup> Dr Barber<sup>19</sup> wrote:

In the treatment of ... disease [of the lymphatic system] ... particular attention should be given to freeing the lymphatic circulation in the immediate vicinity of the enlarged glands. Manipulate the lymphatic glands carefully and thoroughly, rolling them between the finger and thumb, also work under them as deeply as possible. Place the hand lightly over the liver, if enlarged, and vibrate gently for three minutes. Treat in a similar manner any other gland which may be enlarged.

Splenic pumps—manual techniques involving manipulation of the spleen—were among other early OM techniques related to the immune system. However, splenic pumps may not be solely "lymphatic" techniques, as some investigators do not consider the spleen to be part of the lymphatic system. Instead, according to these researchers, the spleen is more accurately described as one of the secondary lymphoid organs

of the immune system—along with such organs as the adenoids and appendix vermiform.<sup>24</sup>

Measel<sup>25</sup> cites several studies conducted between 1910 and 1934 that demonstrate the effect on immune response of osteopathic stimulation of the spleen. In 1910, Clement A. Whiting, DO,<sup>26</sup> studied the use of splenic and liver pumps in a group of patients (N=22), finding that 20 (91%) of the patients had an increase of about 15% in their phagocytic index, the average number of bacteria ingested by each phagocyte after a mixture of blood and bacteria are incubated.<sup>25,26</sup> M. A. Lane, DO,<sup>27</sup> a Still biographer and a professor of pathology and immunology at ASO, experimented with splenic manipulation in rabbits exposed to antigen (sheep erythrocytes). In 1920, Dr Lane found that such manipulations in rabbits increased antibody levels against these antigens.<sup>27</sup>

In the 1930s, Yale Castlio, DO, and Louise Ferris-Swift, DO,<sup>28,29,30</sup> described changes induced by splenic manipulation in asymptomatic subjects. The manual technique they used to induce the changes consisted of applying alternating compressions to the spleen for 1.5 to 5 minutes at a rate of 21 compressions per minute. They reported an increase in leukocyte count in 80% of the cases studied, with a decrease in erythrocyte count in 75% of the cases.<sup>28,29,30</sup> Drs Castlio and Ferris-Swift<sup>28</sup> also found an increase in opsonic index in more than 80% of the cases and an increase in serum bacteriolytic power in 68% of the cases. The researchers<sup>28,29,30</sup> concluded that the increased leukocyte count was the result of "contraction of the spleen and expulsion of its contained leukocytes," while they believed the decreased erythrocyte count was due to increased destruction of red blood cells by the spleen.

Although not a follower of Dr Still, Danish massage practitioner Emil Vodder, PhD, was motivated—like Dr Castlio, Dr Ferris-Swift, and other osteopathic medical researchers—to explore the lymphatic system.<sup>31</sup> While working in the south of France in the 1930s with patients who had chronic sinusitis and diffuse acne, Dr Vodder had the insight to "drain" the stagnant areas associated with these conditions toward the neck. He later realized that he was working with lymphatic pathways, which led him to develop manual techniques that departed from the heavy-pressure techniques of Swedish massage.

Dr Vodder presented his technique, called manual lymph drainage (MLD), at a cosmetology meeting in Paris in 1936.<sup>31</sup> However, because Dr Vodder was not a physician, a physical therapist, or a registered massage therapist, he had difficulty convincing others of the efficacy of his techniques.

It seems improbable but theoretically possible that Dr Vodder's MLD approach was influenced by OM techniques. Similar terminology is found in both Dr Vodder's writings and osteopathic medical texts, including the use of the terms *lymphatic drainage* and *terminal lymphatic*.<sup>31,32</sup>

### Origin of Authentic Lymphatic Pump Techniques

In 1920, C. Earl Miller, DO, developed what soon became known as the Miller thoracic pump technique. He published



**Figure 2.** C. Earl Miller, DO, demonstrates his lymphatic pump technique with an adult patient in 1923. Reprinted from Miller CE. *The mechanics of lymphatic circulation.* J Am Osteopath Assoc. 1923;22:397-398.

numerous articles related to this OM technique in the following years.<sup>33-41</sup> Dr Miller's thoracic pump was the first authentic *lymphatic pump*, a term coined by Dr Miller and his colleagues to describe the impact of intrathoracic pressure changes on lymphatic flow. In describing his technique, Dr Miller wrote that "by the manipulation of this lymphatic pump, it is possible to greatly increase the lymphatic circulation of the entire body."<sup>37</sup>

Dr Miller concurred with Dr Still that "too little attention is given to the lymph and its function."<sup>33</sup> He also agreed that "the normal circulation of body fluids is absolutely essential to normal activities of body function, as well as the health and well-being of the individual."<sup>37</sup>

Dr Miller sought to confirm the osteopathic principle that the cures of an ailing body can be found within the body itself. He wrote that his thoracic pump was "a method of destroying bacteria in the body. I shall endeavor to give and explain a Specific Cure for all bacterial infections ..."<sup>33</sup> He added, "This is not an exception to the rule but rather proof of the theory that the cure for all infections is lymphatic absorption and systemic reaction."<sup>33</sup>

The lymphatic techniques developed by Dr Miller consisted of various gentle manual manipulations, including "manipulation of the thorax" to increase the "force as well as the number of excursions of the pump [diaphragm]."<sup>36</sup>

"The treatment directly relieves the lymphatic and venous stasis and restores the circulation," Dr Miller noted.<sup>39</sup> He also reported,<sup>33</sup> "The technique used in establishing lymphatic absorption is simply to establish a circulation through the lymphatic glands through which the part affected is drained. To accomplish this, I gently manipulate the glands without squeezing or pinching them. I might describe it as milking the lymphatics."

Dr Miller<sup>33</sup> continued:

The technique just described is the method I use specifically for lymphatic drainage. I will now describe what I consider to be a good routine method for the treatment of infections in general.

First, treat the lymphatic glands, through which the infected area is drained, thus causing the absorption of the toxins, to act as a stimulus for the reaction.

Second, treat the spleen to bring about the reaction.

Third, manipulate the spine to stimulate and strengthen the patient to withstand the reaction.

Fourth, having obtained the desired reaction, it is advisable to give plenty of hot drinks or a salt enema to aid elimination.

Dr Miller reported that he successfully used his technique to treat patients for a variety of conditions, including acute infections; edema and ascites; brain edema; pericardial edema; angioneuroedema; anterior poliomyelitis; and congestion of the lymph glands, prostate, and thyroid gland.<sup>38</sup> He also described improvements in blood chemistry, including reductions in blood sugar, blood uric acid, and urea, that occurred within 30 minutes of treatment (Figure 2).<sup>40</sup>

### Lymphatic Pump Techniques After Miller

A number of other lymphatic pump techniques have been developed and investigated since Dr Miller's time.<sup>20,25,42-51</sup> Among the lymphatic pump techniques in use today are the abdominal and pelvic pumps; liver and pancreatic pumps; pedal pumps (ie, Dalrymple pumps); pectoral traction; and—the most recently developed techniques—the auricular, ocular, medulla, and spinal fluid pumps.

In 1982, Measel<sup>25</sup> investigated the effect of lymphatic pumps on the immune response of male medical students (N=25) who were vaccinated with pneumococcal polysaccharide (Pneumovax). He used two serologic tests—bacterial agglutination and passive agglutination—to assess immune response to pneumococcal polysaccharide as an antigen. By day 14, the group of students who received lymphatic pump treatment (n=13) had a statistically greater immune response than the control group (n=12), which received no postimmunization treatment.<sup>25</sup> Measel<sup>25</sup> concluded that lymphatic pump treatments had a positive effect on the B-cell and T-cell components of the human immune system as measured in peripheral blood.

In a 1986 double-blind experiment, Measel and Kafity<sup>42</sup> used a lymphatic pump technique to demonstrate an increase of white blood cell count in peripheral blood, from 7460 erythrocytes per  $\mu\text{L}$  to 9810 per  $\mu\text{L}$ .<sup>42</sup> The B-cell component increased from 5.07% to 9.25%, while the T-cell component rose from 73.2% to 80.9%.<sup>42</sup>

In the 1990s, Jackson et al<sup>43,44</sup> explored the effect of lymphatic and splenic pump techniques on the antibody response to a hepatitis B vaccine. The experimental subjects (n=20) received lymphatic and splenic pump treatments three times per week for two weeks after each vaccination. The researchers, following the typical therapeutic protocol, administered the vac-

inations at 0, 5, and 25 weeks. The control group (n=19) received the vaccinations but no OMT. Fifty percent of the subjects in the treatment group achieved protective antibody titers by week 13 compared with the same result in only 16% of the control subjects.<sup>43,44</sup> The researchers<sup>43,44</sup> cited these results as further evidence that the lymphatic and splenic pumps enhance immune response.

In 1998, Mesina et al<sup>45</sup> reported on seven male subjects who received lymphatic pump treatments consisting of pectoral traction and splenic pumps. A separate cohort of five male subjects serving as the control group did not receive lymphatic pump treatment. Blood samples were collected at 15, 30, 60, 120, and 240 minutes after treatment. All subjects in the treatment group showed significant basophilia, a condition that may play a significant role in initial immune response.<sup>45,46</sup>

Sleszynski and Kelso<sup>47</sup> reported in 1993 on a one-year randomized researcher-blinded trial of the thoracic lymphatic pump in patients who had undergone low-risk cholecystectomy (N=42). Half of the subjects received treatment with the thoracic lymphatic pump, while the other half received incentive spirometry. Atelectasis occurred in two (10%) patients in each group. However, patients treated with the thoracic lymphatic pump had earlier recovery and quicker return to preoperative values of forced vital capacity than did those treated with incentive spirometry.<sup>47</sup>

There are also animal models that support the efficacy of lymphatic pump techniques. Dery et al<sup>48</sup> demonstrated in healthy laboratory rats that lymphatic pumps can increase the distribution rate of lymph. They also demonstrated in rats that mechanical pressure, similar to thoracic pumps, applied to regions of the body distant from the location of lymph formation can enhance lymph uptake.<sup>49</sup> These researchers used a technique consisting of intermittent pressure on the lateral aspect of the lower ribs, followed immediately by light taps on the sternum to "encourage inspiration."<sup>49</sup>

In this issue of *JAOA—The Journal of the American Osteopathic Association*, Knott et al<sup>50</sup> demonstrate that both thoracic and abdominal pumps caused increases in real-time measurements of lymph flow through the thoracic ducts of five dogs, from  $1.20 \pm 0.41$  to  $3.45 \pm 1.61$  mL/minute<sup>-1</sup>. The effects of these lymphatic pump treatments occurred without changes in hemodynamic measurements, such as mean arterial pressure, heart rate, or cardiac output.

Although these and a number of other recent studies have supported the efficacy of lymphatic pump treatments for various pathologic conditions, it should be noted that Dugan et al<sup>51</sup> was not able to confirm such benefits in a 2001 study that examined the effect of OM techniques on the antibody responses to influenza vaccination (N=28). The treatment group (n=14) received OMT (lymphatic pump and rib raising) immediately following vaccination and again three days later. The control group (n=14) received only the influenza vaccine. Blood samples were taken before vaccination and at 7 and 21 days postvaccination.<sup>51</sup> Serum antibody of the IgG and

IgM classes were measured by enzyme immunoassay. The researchers failed to find a statistically significant effect of OMT in this particular study.<sup>51</sup>

### Additional Osteopathic Manipulative Techniques for the Lymphatic System

Following the teachings of A. T. Still, Frederic P. Millard, DO, began his research into the lymphatic system in the early years of the 20th century.<sup>52</sup> Through the 1940s, he published numerous articles related to pathologic processes in the lymphatic system.<sup>52-63</sup> Dr Millard also founded the International Lymphatic Research Society in Kirksville, Mo, and served as the society's president. In 1922, he published *Applied Anatomy of the Lymphatics*,<sup>54</sup> the first osteopathic medical book examining only the lymphatic system (Figures 3 and 4).

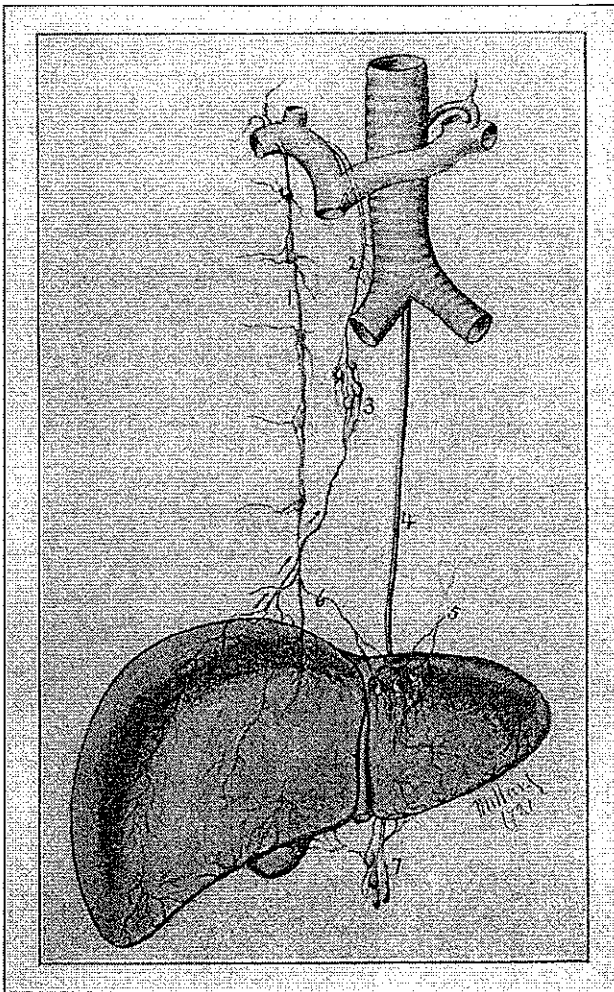
In an article published in 1920 titled "New method of diagnosing various diseases by palpating lymphatic glands,"<sup>53</sup> Dr Millard described major points of lymph node palpation for specific clinical diagnostics based on lymphatic, osseous, fascial, and nerve lesion findings. His recommended treatments typically took 5 to 10 minutes to complete.<sup>53</sup>

Dr Millard explained, "We want to assist the student by demonstrating that in any pathological condition there is invariably a relative lymphatic disturbance, and try to show how adjustment will assist the body in clearing up the retardation or obstruction."<sup>55</sup> In 1923, Dr Millard wrote, "The time will come ... when every organic disease will be considered in association with lymphatic blockage."<sup>60</sup>

In 1929, William Otis Galbreath, DO, developed a simple lymphatic technique using mandibular manipulation in a pumping fashion to help open and close the eustachian tube, thereby allowing "the ear to drain accumulated fluid more effectively."<sup>64</sup> Promising research has recently supported the efficacy of the Galbreath technique in treating children for otitis media.<sup>64,65</sup>

Frank D. Chapman, DO, and his wife, Ada Hinckley Chapman, DO—both graduates of ASO—made important contributions to research on the lymphatics during the 1930s. In 1937, Dr Ada Hinckley Chapman and Charles Owens, DO, wrote the book *An Endocrine Interpretation of Chapman's Reflex*, which described a system of reflex points first used by Dr Frank Chapman.<sup>66</sup> Drs Chapman and Owens described these reflex points as predictable fascial tissue abnormalities that reflect visceral dysfunction or pathology. In the book's introduction, Dr Frank Chapman explained, "It seemed to me that the lymphatic system had much more profound influence on bodily functions than it had been given credit for."<sup>66</sup> He added, "my special plea is on behalf of the lymphatic aspects of disease, which I regard of paramount importance whether they originated in bony lesions, infections, toxins, or other cause."<sup>66</sup>

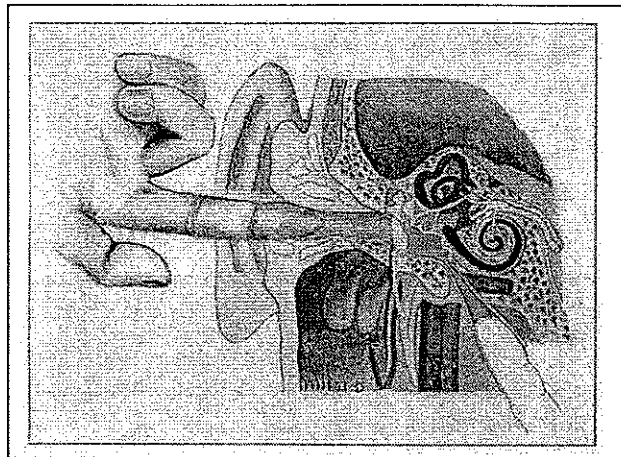
In the foreword to the Chapman and Owens book, Fred Mitchell, Sr, DO, noted that the reflex points were "clinically useful in three principle ways: (1) for diagnosis; (2) for influ-



**Figure 3.** Frederick P. Millard, DO, created this illustration of "terminal drainage of the liver through the three-fold channels." Dr Miller labeled the illustration as follows: "(1) Internal mammary chain, (2) Mediastinal lymph drainage, (3) Nodes near inferior vena cava, (4) Thoracic duct, (5, 6) Lymph channels from nodes back of ensiform cartilage, (7) Receptaculum chيلي." Reprinted from Millard FP. *Applied Anatomy of the Lymphatics*. Kirksville, Mo: International Lymphatic Research Society; 1922. Image courtesy of the American Academy of Osteopathy, Indianapolis, Ind.

encing the motion of fluids, mostly lymph; and (3) for influencing visceral function."<sup>66</sup> He also explained that the surface changes of Chapman's reflex can be found in the deep fascia as "gangliform contractions" located at specific points of the body and related to fixed organs.<sup>66</sup> Unfortunately, to this day, biopsies of the identified areas have not correlated with the specific pathologic changes associated with Chapman's reflex points.<sup>67</sup>

Another graduate of ASO, William Garner Sutherland, DO,<sup>68,69,70</sup> became most famous over the course of his long



**Figure 4.** Frederick P. Millard, DO, explained his "bimanual technic" by writing, "The forefinger of the right hand is dilating the right external auditory canal, while the forefinger of the left hand is dilating the pharyngeal orifice of the right Eustachian tube (same side), in the treatment of catarrhal deafness. The lymphatics at both ends are treated at the same time, and the peripheral inhibition stimulates the center." Reprinted from Millard FP. *Applied Anatomy of the Lymphatics*. Kirksville, Mo: International Lymphatic Research Society; 1922. Image courtesy of the American Academy of Osteopathy, Indianapolis, Ind.

career for his cranial concept, which was based on his belief that the bony cranium was capable of motion.<sup>68</sup> Although Dr Sutherland focused mainly on cerebrospinal fluid in his research, he also developed some original OM techniques for the lymphatic system. For example, Dr Sutherland's views on the possible effect on the lymphatics of his soft tissue/fascia techniques were described by H.A. Lippincott, DO,<sup>69</sup> "The fasciae envelop, separate, protect, and support the various structures. Not the least important of their functions is to encourage and direct the movement of tissue fluids and to promote the flow of lymph through its channels."

In one of the many lectures he delivered during the 1940s and 1950s, Dr Sutherland<sup>70</sup> described the following lymphatic technique:

Now let us talk about the application of the science of osteopathy in securing regulation of the normal flow of the lymph stream. I hope to illustrate the application as a demonstration of non-incisive surgery. It is necessary in all applications to form a mental picture of the mechanism as the first step in the procedure. ... The physiologic emptying requires a gentle and rather unique siphoning process in the thoracic duct.

This process can be assisted or facilitated by the use of feeling, seeing, thinking fingers. ... During the application, fingers of one hand establish a contact over lymph nodes while a transmitted vibration is initiated through the other hand, which is placed on top of it. A quiet pause-rest should occur between applications.

The first application is to the upper left thorax near the axilla. The second is done with a lift to the area above the receptaculum chyli. The third application is at the great omentum, with a lift.

The transmitted vibration initiates the siphoning process. ... The object in lifting the great omentum is to tip it over, flop it over.<sup>70</sup>

Another osteopathic physician who pursued greater understanding of lymphatic treatments was Gordon J. Zink, DO,<sup>71</sup> professor at the Des Moines University, College of Osteopathic Medicine and Surgery in Iowa. Dr Zink, who was affectionately nicknamed "the lymphomaniac," developed lymphatic techniques to increase diaphragmatic motion and stimulate reflex on the lymphatic system. He also promoted direct "milking" techniques for the lymphatics. He suggested, for example, the use of pectoral traction, applied approximately twice a day for 3 to 5 minutes at a time, rather than lymphatic pumps, which he noted were beneficial but are "also time-consuming and have to be repeated frequently."<sup>71</sup>

Dr Zink<sup>71</sup> wrote,

[T]o apply pectoral traction, have the patient lie in the supine position. ... The physician sits at the head of the patient and, taking hold of the anterior axillary fold, slowly and gently applies traction in an upward and backward direction. ... Unless it is contraindicated, the physician can increase his grasp on the pectoral tissues and have the patient take a deep breath and give an explosive cough. This will cause a more dramatic physiologic response and shorten treatment time.

## Conclusion

Throughout history, people in different societies have used various methods of manual manipulation as therapeutic tools. However, osteopathic medicine emerged as the first scientific system of healthcare to develop specific manual techniques related to the lymphatic system.

Today, osteopathic physicians use many OM techniques for lymphatic stimulation. Recent research supports improved understanding of and continued advancements in original, noninvasive, and efficacious osteopathic lymphatic techniques.

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