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Clinical Care Points: A Nurse's Guide to Venous and Lymphatic Healing

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Abstract

Chronic venous insufficiency (CVI) and lymphedema are progressive conditions that significantly impact wound healing and patient outcomes. Venous hypertension and impaired lymphatic drainage lead to edema, inflammation, and tissue damage, creating an environment conducive to ulceration. Nurses play a crucial role in identifying and managing these conditions through evidence-based strategies. Compression therapy is a cornerstone of treatment, reducing edema and promoting wound healing. Wound bed preparation, including debridement and moisture balance, is essential for optimizing healing outcomes. Lymphedema management involves complete decongestive therapy (CDT), consisting of manual lymphatic drainage, compression, decongestive exercises, and patient education. Lifestyle modifications, such as maintaining a healthy weight and engaging in regular exercise, are important adjuncts to treatment. Surgical interventions, including endovascular procedures for CVI and advanced surgical techniques for lymphedema, offer promising outcomes in selected cases. Nurses must assess patients holistically, considering factors such as arterial perfusion, infection, nutrition, and psychosocial well-being. By addressing the underlying pathophysiology, implementing appropriate interventions, and providing patient education, nurses can significantly improve wound healing rates, prevent recurrence, and enhance quality of life for individuals affected by CVI and lymphedema.

Keywords: Lymphedema, Venous leg ulcer, Chronic venous insufficiency, nurses.

Introduction

The lymphatic system plays a pivotal role in maintaining fluid balance and immune function by removing excess interstitial fluid, proteins, and waste products from the body. Alongside the venous system, the lymphatic system ensures adequate tissue perfusion and fluid drainage, which are critical for normal cellular function and tissue health. However, any impairment in the venous or lymphatic systems can significantly disrupt this equilibrium, leading to fluid accumulation, chronic edema, and delayed wound healing. These

complications are particularly concerning in patients with chronic venous insufficiency (CVI) or lymphedema, both of which are progressive conditions requiring early recognition and intervention to optimize clinical outcomes.

Wound care in venous disease and lymphedema

Venous disease and lymphedema are closely interlinked and often present significant challenges in wound management. Chronic venous disease leads to elevated venous pressures, venous stasis, and subsequent skin changes, creating an environment conducive to ulcer formation. Lymphedema, on the other hand, results in impaired lymphatic drainage, leading to protein-rich fluid accumulation in the interstitial space, inflammation, and fibrosis. Together, these conditions can synergistically exacerbate tissue hypoxia, compromise immune responses, and hinder the body's ability to heal wounds effectively.

In venous disease, the presence of valvular incompetence or venous obstruction can cause retrograde blood flow, which increases venous pressure and subsequently damages the capillary walls. This phenomenon, known as venous hypertension, contributes to vascular permeability, allowing plasma proteins and red blood cells to leak into surrounding tissues. The resulting edema and inflammatory responses can lead to skin changes, such as hyperpigmentation, lipodermatosclerosis, and eventual ulceration. Moreover, wounds that develop in the presence of venous hypertension often display irregular margins, fibrinous exudate, and significant periwound inflammation, further complicating the healing process.

Lymphedema exacerbates these challenges through impaired lymphatic function, which hampers the removal of inflammatory cytokines, cellular debris, and metabolic waste products. Over time, persistent lymphedema causes dermal thickening, fibrosis, and the development of lymphostatic ulcers. Unlike venous ulcers, lymphatic ulcers are often associated with firm, fibrotic skin and are less exudative. These distinctions are important in clinical assessment and management, as they guide appropriate interventions tailored to the underlying pathophysiology.

The interplay between venous disease and lymphatic dysfunction highlights the importance of a multidisciplinary approach to wound care. Effective management must address both the underlying circulatory abnormalities and the associated local wound environment. This includes reducing edema, managing infection, promoting moist wound healing, and ensuring adequate oxygenation and perfusion to the affected tissues. Compression therapy, wound debridement, and advanced wound care technologies are essential components of a comprehensive care plan for these patients.

Edema management

The venous system is responsible for transporting deoxygenated blood back to the heart, while the lymphatic system plays a key role in circulating lymphatic fluid and removing metabolic waste. At the capillary level, oxygenated blood delivers nutrients, water, and oxygen to tissues through normal vascular permeability, allowing filtration of these elements into the interstitial space. Simultaneously, the venous system returns deoxygenated blood to the heart, and the lymphatic system eliminates waste products, preventing fluid accumulation. Both systems share several structural and functional similarities, including superficial and deep components, the presence of valves, and reliance on muscle pumps to facilitate fluid movement.

When edema persists for prolonged periods, it induces inflammatory changes that exceed normal physiological levels. This chronic inflammation, coupled with increased interstitial pressure, can lead to venous leg ulcers (VLUs). Without appropriate intervention, the combination of edema and inflammation contributes to chronic hypoxia, permanent skin changes, recurrent infections, and non-healing wounds. Addressing edema promptly is, therefore, essential to mitigating these complications and improving patient outcomes.

Both chronic venous disease and lymphedema are progressive in nature, underscoring the importance of early diagnosis and intervention. As these conditions advance, the risk of skin ulceration increases, particularly in individuals with predisposing factors such as venous hypertension or impaired lymphatic drainage. Effective wound care strategies should adhere to fundamental principles of wound healing, including maintaining a clean wound environment, ensuring adequate moisture balance, and addressing potential infections. In cases where venous and lymphatic dysfunction coexist, compression therapy is a cornerstone of treatment to reduce edema and promote wound healing (Trayes et al., 2013).

Edema may arise from various etiologies, including congestive heart failure, renal failure, pregnancy, venous insufficiency, lymphedema, May-Thurner syndrome, and adverse medication effects. Accurate diagnosis is paramount to guiding appropriate treatment interventions. Research indicates that approximately 50% of individuals over the age of 50 in the United States develop varicose veins, with these conditions affecting roughly 30% of the general population (Shadrina et al., 2022). Chronic venous insufficiency (CVI), a more advanced form of venous disease, impacts an estimated 25 million adults in the United States, with nearly 6 million individuals experiencing severe manifestations. The financial burden of venous ulcer care in the United States alone is estimated at $3 billion annually (Eberhardt & Raffetto, 2014).

Epidemiological studies reveal that 10% to 35% of adults in the United States have CVI, with venous ulcers developing in approximately 4% of individuals aged 65 years or older (Bonkemeyer Millan et al., 2019). The prognosis for venous ulcers is often poor, with recurrence rates reaching up to 40% despite standard treatment approaches (Patel & Surowiec, 2024). Lymphedema, another major contributor to chronic edema, affects an estimated 35 million individuals in the United States (O'Donnell et al., 2020). While primary lymphedema is relatively rare, occurring in approximately 1 in 100,000 individuals, secondary lymphedema is far more common, with a prevalence of 1 in 1,000 Americans (Sleigh & Manna, 2023).

Recent research highlights chronic venous insufficiency as the leading cause of lower extremity lymphedema, accounting for 41.8% of cases, followed by cancer-related lymphedema, which comprises 33.9% of cases. Szyber and colleagues further report that out of the estimated 6 million cases of lower limb lymphedema, approximately 60% are associated with chronic venous insufficiency. These findings underscore the complex interplay between venous disease and lymphatic dysfunction, highlighting the need for integrated treatment strategies to optimize patient outcomes and prevent disease progression.

PHASES OF HEALING

Acute wounds progress through a sequence of physiological processes that overlap yet possess distinct clinical characteristics. The healing process consists of four phases: clotting, inflammation, proliferation, and maturation. If an acute wound's healing process is disrupted, it may transition into a chronic wound, reverting to the inflammatory phase. Thus, accurately diagnosing the underlying cause and identifying factors that may hinder the healing process are essential. A comprehensive assessment should determine the wound etiology, followed by an evaluation of both the wound and the surrounding skin to establish the current healing phase. This evaluation is crucial in selecting appropriate interventions and products to promote wound healing. Many patients seeking care often have wounds arrested in the inflammatory phase. Indicators of the inflammatory phase include peri-wound erythema, edema, pain, induration, and increased exudate in the absence of granulation tissue. During the proliferative phase, granulation tissue begins to form, and the signs of inflammation diminish. Finally, the maturation phase involves the closure of skin defects accompanied by ongoing collagen maturation, a process that can extend for up to a year. Maximum wound tensile strength is achieved approximately 11 to 14 weeks post-injury. However, the resulting scar will never

attain 100% of the original skin's tensile strength; instead, it stabilizes at approximately 80% (Bowden et al., 2016).

CLINICS CARE POINTS—PHASES OF HEALING

Patients with chronic wounds require the following throughout the healing process:

- Diagnosis and appropriate management of the underlying issue (differential diagnoses, including mixed ulcers, pyoderma gangrenosum, May-Thurner syndrome, metabolic disorders, skin cancers, and other conditions).
- Assessment of perfusion (both large and small vessel arterial circulation) and evaluation of average diffusion distance, as increased edema prolongs diffusion distance and delays the delivery of oxygen and nutrients to tissues.
- Treatment of local and systemic infections, if present, since prolonged wound duration increases the risk of infection.
- Maintenance of adequate hydration.
- Referral to a dietitian if malnutrition is present. This should include addressing hydration, protein intake, caloric requirements, and supplementation with arginine, glutamine, and essential micronutrients, as over 50% of hospitalized patients may suffer from malnutrition, which severely impairs their healing potential.

Chronic wounds require the following considerations throughout the healing process:

- Ensuring adequate oxygen delivery to the wound bed and tissue. Transcutaneous oxygen measurements below 40 mm Hg during normobaric breathing (or below 50 mm Hg in diabetic patients) indicate hypoxia, while levels under 30 mm Hg suggest severe hypoxia and limited wound healing potential.
- Maintaining an appropriate wound bed temperature. Studies demonstrate that a temperature of 33°C is critical for optimal neutrophil, fibroblast, and epithelial cell activity, as these cell functions significantly decline below this threshold.
- Ensuring proper pH levels. Chronic wounds typically exhibit a pH range between 7.15 and 8.9.
- Addressing biofilm formation, as an estimated 60% to 100% of chronic non-healing wounds are affected by biofilm.
- Regular removal of wound debris, necrotic tissue, callouses, and closed edges. Frequent debridement reactivates the acute repair process, facilitating epithelial migration from the wound edges.

UNDERSTANDING THE VENOUS SYSTEM

The venous and arterial systems together form the circulatory system, functioning as a closed loop. The arterial system is responsible for delivering oxygenated blood to tissues and organs, whereas the venous system, a low-pressure network, returns deoxygenated blood to the heart. At rest, approximately two-thirds of the body's blood volume resides within the venous system. Unlike the arterial system's pulsatile action, the venous system must function against gravity. Its effectiveness depends on the proper functioning of valves, unobstructed veins, and the muscle pump. Healthy valves prevent venous reflux, while skeletal muscle contractions during physical activity propel blood toward the heart. Dysfunction in any of these components can lead to the accumulation of deoxygenated blood, elevated pressure, and the potential development of chronic venous insufficiency (CVI). Valve failure, particularly in the great saphenous vein below the knee, often results in blood flowing backward from deep to superficial veins (Pagano et al., 2018). The prevalence of this condition increases with age, affecting approximately 7% of individuals by the age of 50 and rising to about 20% by the age of 70.

Acute deep vein thrombosis (DVT) can also elevate venous pressure, resulting in interstitial fluid accumulation. While the lymphatic system works to remove this excess fluid, prolonged strain may lead to its eventual damage. Obesity further exacerbates this issue by

increasing intra-abdominal venous pressure, which negatively impacts lower leg veins and the lymphatic system.

PROGRESSION AND STAGES OF VENOUS DISEASE

Venous disease advances through several stages, each marked by specific symptoms that assist health care providers in selecting the most suitable treatment. The CEAP classification system serves as the recognized standard for staging chronic venous insufficiency (CVI). Venous duplex ultrasound remains the gold-standard method for evaluating and confirming CVI.

CEAP is an acronym that stands for:

- **C**: Clinical, referring to the observable manifestations of the disease in the body.
- **E**: Etiology, identifying the underlying cause.
- **A**: Anatomy, describing the specific location of the pathology.
- **P**: Pathophysiology, explaining how blood flow is affected.

First introduced in 1994 and recently updated, the CEAP classification system represents the progression of CVI. While all four categories can be assessed, the clinical classification ("C") is most commonly used for staging.

Venous Stages:

- **C0**: No visible signs of disease.
- **C1**: Presence of visible veins or small blood vessels.
- **C2**: Varicose veins.
- **C3**: Edema.
- **C4**: Changes in skin quality.
- **C5**: Healed ulcers.
- **C6**: Active ulcers.

SYMPTOMS OF VENOUS DISEASE

- Limb heaviness.
- Pain.
- Edema, including pitting edema, where an indentation remains after gentle finger pressure.
- Varicose veins.
- Telangiectasias.
- Lipodermatosclerosis, a form of panniculitis that causes skin hardening, increased pigmentation, swelling, and redness.
- Inverted champagne bottle deformity of the lower leg.
- Stasis dermatitis.

VENOUS ULCERS

Several risk factors contribute to venous disease, including age over 55 years, family history of CVI, elevated body mass index, a history of pulmonary embolism or superficial/deep venous thrombosis, skeletal or joint disease in the lower extremities, multiple pregnancies, parental history of ankle ulcers, physical inactivity, prior ulcers, and severe lipodermatosclerosis. Venous reflux in deep veins is another significant factor (Vivas et al., 2016).

Approximately 76% of cases can be diagnosed based on clinical presentation. Venous ulcers often exhibit an irregular wound shape well-defined borders, and a shallow wound bed with granulation tissue and fibrin. These ulcers commonly occur around the medial malleolus, the gaiter region, or circumferentially. Additional characteristics include edema and hemosiderin staining, which appears as brown or purple discoloration on the lower leg. Atrophy blanche, a clinical sign linked to venous hypertension and often observed following ulcer healing, is characterized by smooth white plaques surrounded by hyperpigmented borders and

telangiectatic blood vessels (Alavi et al., 2014). Stasis dermatitis, an inflammatory skin condition, is also prevalent among patients with CVI.

TREATMENT INTERVENTIONS

Lifestyle Modifications

- Maintain a healthy weight.
- Follow a balanced diet.
- Engage in regular exercise.
- Avoid prolonged periods of sitting.
- Increase activity levels, such as walking multiple times per week. Muscle pump activation combined with diaphragmatic breathing supports blood return to the heart.
- Control high blood pressure.
- Elevate legs above heart level.

Peripheral Artery Disease Screening/Testing

Screening for arterial disease is crucial, as approximately 20% of venous ulcers are associated with arterial insufficiency.

WOUND CARE

Before employing compression therapy as a supplementary intervention, it is essential to prepare the wound bed and peri-wound tissue.

Wound Bed Preparation

Tissue Management Tissue management involves the removal of necrotic or devitalized tissue, bacteria, and other cellular components that impede the healing process. Debridement methods include surgical, sharp, biological, mechanical, enzymatic, and autolytic approaches, each with specific indications and contraindications. Research by Wilcox and colleagues demonstrated that frequent debridement positively influences wound healing outcomes.

Tissue/Inflammation The management of bioburden can be achieved through debridement, wound cleansing, and the application of antimicrobials or antibiotics for systemic infections.

MOISTURE BALANCE

Maintaining an optimal wound moisture level is essential for promoting epithelialization and maximizing the effects of growth factors and proliferating cells. The selection of appropriate dressing categories is determined based on the wound characteristics. Excessive exudate can result in maceration of the wound and peri-wound tissue, skin irritation, and increased risk of infection (Britto et al., 2024).

EPITHELIAL (EDGE) ADVANCEMENT

Epithelial cell migration occurs from the wound edges as healing progresses. Factors such as rolled wound edges, necrotic tissue, callouses, and closed wound edges can inhibit this migration, necessitating clinician intervention to address these barriers.

REPAIR/REGENERATION

The objective is to facilitate wound closure by providing a supportive matrix for cell infiltration, stimulating cellular activity through signal molecules or growth factors, delivering oxygen therapy, or incorporating stem cell therapy.

SOCIAL CONSIDERATIONS

Clinicians must evaluate the patient’s psychosocial and physical risk factors, comorbidities, and living conditions, as these factors can significantly influence the patient’s ability to achieve successful wound healing.

WOUND HYGIENE

In 2019, an international panel of wound care experts convened to address biofilm management, resulting in a consensus document emphasizing wound hygiene as a key component of open wound care. Wound hygiene consists of four primary components: cleansing, debridement, edge refashioning, and dressing application.

DRESSING CATEGORIES FOR HIGHLY EXUDATIVE WOUNDS

- **Calcium Alginates**: Absorb moderate to large amounts of exudate.
- **Hydrofibers**: Highly absorbent, wick exudate efficiently, and form a gel when in contact with exudate.
- **Foam Dressings**: Capable of absorbing moderate to large amounts of exudate, with multiple variations available to suit specific needs.
- **Superabsorbents**: Designed to absorb significant amounts of exudate.
- **Negative Pressure Devices**: Available in various formats with small to large canisters for exudate collection.
- **Antimicrobials**: Dressings that reduce wound bed bioburden, available across multiple categories.

MEDICATIONS

- **Antibiotics**: Oral, intravenous, or topical antibiotics may be used to manage infections.
- **Anti-inflammatory Medications**: Potentially effective for managing pain and inflammation.
- **Pentoxifylline**: Demonstrated to be effective in conjunction with compression therapy for treating venous ulcers. A review by Milan and colleagues of seven randomized controlled trials showed that pentoxifylline combined with compression improved venous ulcer healing compared to compression with a placebo. Four of these trials also found that pentoxifylline alone was more effective in promoting healing than placebo alone (Jull et al., 2012).
- **Micronized Purified Flavonoid Fraction (MPFF)**: Research indicates MPFF enhances functional lymphatic capillary numbers, reduces capillary diameter, and lowers endolymphatic pressures after four weeks of therapy. Studies further show that MPFF improves symptoms with a dose of 1000 mg daily or 500 mg twice daily, with results observed after two weeks (Kirienko & Radak, 2016; Leng et al., 2019).

COMPRESSION THERAPY

Compression therapy is considered the cornerstone treatment for venous leg ulcers. It can be administered using medical compression bandages, garments, Velcro devices, or intermittent pneumatic compression (IPC). Prior to applying compression, clinicians must address arterial insufficiency, infection, and systemic conditions such as acute congestive heart failure and kidney failure (Felty & Rooke, 2005).

The primary goals of compression therapy include reducing edema and pain, promoting ulcer healing, and preventing recurrence. Additional objectives include improving skin stability, reducing venous reflux, and managing varicose veins. Multiple forms of compression are available, and factors such as age and activity level should be considered when selecting the appropriate option. Compression modalities include elastic and non-elastic bandages, Unna boots, Duke boots, multilayer systems, Velcro devices, garments, stockings, and IPC pumps (Rabe et al., 2018).

Certified lymphedema therapists, certified compression fitters, and representatives from medical-grade compression companies, such as Jobst (Sweden), Sigvaris (Winterthur, Switzerland), Juzo (Julius Zorn, Inc., OH, USA), Lohmann-Rauscher (Lohmann & Rauscher GmbH & Co. KG, Rengsdorf, Germany), and Medi (Medi GmbH & Co. KG, Bayreuth, Germany), can provide guidance on proper fitting of compression garments.

When measuring for compression garments, the extremity must first be reduced in size. Contraindications to compression therapy include acute deep vein thrombosis, peripheral arterial disease, acute infection, material allergies, severe cardiac insufficiency, and neuropathy with sensory loss or microangiopathy.

Medical compression garments are available in circular or flat knit patterns. Flat knit patterns are customized and provide effective tissue containment. Manufacturers' recommendations for washing and drying compression garments and bandages should be followed. Patients are advised not to sleep in compression garments, as they are best applied in the morning and removed before bed. For patients requiring nighttime compression, alternative solutions are available.

TED stockings, which provide approximately 8 mm Hg of compression, are primarily used post-surgically to prevent deep vein thrombosis (DVT). However, TED stockings are not suitable for ambulatory patients with chronic venous insufficiency or lymphedema, as they do not adequately manage swelling (O'Donnell et al., 2014).

Replacement of compression garments is recommended every six months or sooner if the garment becomes damaged. Various donning and doffing aids are available to assist patients with applying and removing compression garments.

CompressionLevels

Compression therapy is classified into several levels based on the pressure exerted, measured in millimeters of mercury (mm Hg).

- **15 to 20 mm Hg**: These over-the-counter options are intended for mild swelling; however, they are insufficient for patients experiencing venous or lymphatic swelling.
- **20 to 30 mm Hg**: This is classified as Medical Grade Class I compression. It is utilized to manage swelling, varicose veins, travel-related edema, and sports-related symptoms.
- **30 to 40 mm Hg**: Known as Medical Grade Class II compression, this level provides stronger pressure and is applied for moderate to severe cases, such as venous ulcers and lymphedema.
- **40 to 50 mm Hg**: Medical Grade Class III compression delivers very strong pressure and is typically reserved for severe cases of venous disease and lymphedema.

Surgical—EndovascularInterventions

Endovascular procedures aim to facilitate ulcer healing and reduce recurrence rates. Early endovenous ablation, when performed alongside compression therapy during the presence of an ulcer, has been shown to accelerate healing rates compared to compression therapy alone or delayed intervention after 6 months of non-healing ulcers.

Prognosis

Poor prognostic indicators for ulcer healing include an ulcer duration of over 3 months, an ulcer length greater than 10 cm (3.9 inches), coexisting lower limb arterial disease, advanced age, and elevated body mass index. According to Margolis (2004), wounds smaller than 10 cm^2 and less than 12 months old at the initial assessment have a 29% chance of remaining unhealed by the 24th week of treatment. In contrast, wounds larger than 10 cm^2 and older than 12 months demonstrate a 78% likelihood of not healing.

CLINICS CARE POINTS—VENOUS

- Patients with venous ulcers and sufficient arterial perfusion benefit from therapeutic compression therapy. The choice of compression type should align with patient-specific needs.
- Venous disease is progressive and often results in ulcers at advanced stages. Edema increases the diffusion distance for oxygen and nutrients to the skin and ulcers; reducing edema shortens this distance.
- If chronic venous insufficiency (CVI) is not managed, the lymphatic system may become overwhelmed, leading to combined venous and lymphatic failure, which requires comprehensive decongestive therapy (CDT).
- Diaphragmatic breathing is beneficial for enhancing venous and lymphatic drainage while reducing inflammation in individuals with lower limb venous and lymphatic damage.

LYMPHATIC SYSTEM

Pathophysiology

The primary function of the lymphatic system is the removal of excess fluid and metabolic waste. This fluid, known as lymph, comprises water, proteins, waste products, and long-chain fatty acids. The superficial lymphatic system consists of vessels located just beneath the skin and lymph nodes that filter lymph before it reaches the deep lymphatic system, eventually reentering the bloodstream (Griffiths et al., 2016).

Unlike the venous and arterial systems, which are closed circulatory systems, the lymphatic system is open, originating at the capillary level and terminating at the venous angles. Initial lymphatic capillaries remove fluid, proteins, and larger molecules such as cell fragments and fatty acids. The lymph fluid then travels through vessels toward regional lymph nodes for filtration. Cervical nodes filter lymph from the head and neck, axillary nodes filter fluid from the upper extremities and upper quadrants, and inguinal nodes filter fluid from the lower extremities, external genitalia, and lower abdomen.

The left venous angle processes approximately 2–4 liters of lymph fluid daily, while the right venous angle handles about 250 mL. This difference results from the regions each angle drains. For example, the left venous angle processes lymph from the digestive tract, both inguinal regions, and the left axillary and cervical lymph nodes, while the right venous angle receives lymph only from the right cervical and axillary lymph nodes.

Proteins in lymph fluid generate colloidal osmotic pressure, which helps retain water in plasma and interstitial spaces. A functional lymphatic system efficiently removes these hydrophilic proteins. Without lymphatic function, survival would be compromised within 24 hours. Diuretics are not recommended for treating swelling caused solely by lymphedema, as they remove water but leave proteins, which then attract water back into the interstitial spaces after diuretic use ceases. The remaining proteins act as proinflammatory macromolecules, causing irreversible soft tissue changes and increasing the risk of cellulitis. However, some patients with lymphatic conditions may also require diuretics for cardiac conditions, and their physicians should determine appropriate usage and dosages.

Phlebolymphedema occurs when damage to the lymphatic system is secondary to venous system failure. Venous damage overwhelms the lymphatic system, impairing its ability to remove interstitial fluid (Warren et al., 2007).

LymphedemaStages

The International Society of Lymphology (ISL) Consensus Document outlines four stages of lymphedema progression based on swelling and skin conditions (Kim et al., 2014):

- **Stage 0**: This is the latent or subclinical stage, where impaired lymph transport exists, but swelling is not yet visible. This stage may persist for months or years. Early intervention during this stage yields favorable outcomes and can prevent further progression.
- **Stage I**: Known as the reversible stage, it involves an initial accumulation of high-protein lymph fluid, which diminishes with elevation. Swelling may be pitting, and treatment with CDT can achieve positive outcomes.
- **Stage II**: Swelling increases, and limb elevation no longer resolves it. Pitting may still occur initially but can become difficult as tissue fibrosis progresses. Treatment and management can still yield improvements during this stage.
- **Stage III**: Referred to as lymphostatic elephantiasis, this stage is characterized by non-pitting edema, fibrotic tissue, thickened skin, hyperpigmentation, and warty overgrowths. Observable skin changes, rather than limb size, define this stage. Treatment is beneficial but often requires an extended duration (Executive Committee of the International Society of Lymphology, 2020).

Characteristics

Lymphedema diagnosis is primarily clinical; imaging such as lymphoscintigraphy is reserved for cases with diagnostic uncertainty. Severity is classified based on the percentage increase in limb volume: mild (<20%), moderate (20–40%), or severe (>40%).

- **Primary lymphedema**: This congenital condition is often present in the lower limbs, but symptoms may develop later in life, particularly after puberty or injury. A familial history is often observed.
- **Secondary lymphedema**: This occurs due to lymphatic damage resulting from factors such as surgery, trauma, chronic venous insufficiency, infection, radiation, or obesity.

Treatment

The gold standard treatment for lymphedema is complete decongestive therapy (CDT), typically performed by Certified Lymphedema Therapists. CDT involves two phases: the initial decongestive phase, during which the therapist reduces swelling and educates the patient, followed by a self-care phase where patients maintain results.

Manual Lymphatic Drainage

Manual lymphatic drainage (MLD) is a gentle therapeutic technique that stimulates the superficial lymphatic system. During treatment, decongestion occurs from proximal to distal segments of the affected extremity (Lasinski, 2013).

Skin Care

Patients with lymphedema may experience recurrent infections due to an increased diffusion distance caused by fluid accumulation. Clinicians often use moisture-wicking products, zinc-based formulations, and skin wipes to protect and maintain skin integrity.

Compression/Bandaging

The initial phase of treatment involves the use of short-stretch bandages to decongest the affected extremity. Once decongestion has been achieved, the patient is measured for appropriate compression garments. The required pressure level is determined based on arterial perfusion and patient-specific considerations. Compression levels include:

- **15–20 mm Hg**: Over-the-counter compression offering a low level of pressure.
- **20–30 mm Hg**: Class I compression that provides moderate pressure without being overly aggressive.
- **30–40 mm Hg**: Class II compression offering more substantial support.
- **40–50 mm Hg**: Class III compression, which delivers very strong pressure.

A variety of garment styles are available depending on the area of treatment, such as knee-high, thigh-high, pantyhose, open or closed toes, arm sleeves, hand gauntlets, chest, head, and neck garments.

Decongestive Exercises

Decongestive exercises are critical for improving lymphatic transport through the muscle pump mechanism. Diaphragmatic breathing exercises are particularly effective in enhancing lymphatic and venous circulation. Simple ambulation combined with leg exercises while wearing compression garments is considered adequate for lymphatic management.

Education

Patient education focuses on transitioning to the self-care phase of complete decongestive therapy (CDT). This includes instruction on self-manual lymphatic drainage (self-MLD), self-bandaging, proper donning and doffing techniques for compression garments, garment care, a home exercise program, and guidelines on activities to avoid or engage in safely.

Kinesio Taping

Kinesio taping, developed by Dr. Kenzo Kase, involves applying elastic adhesive tape to targeted locations on the skin. This technique gently lifts the skin, facilitating lymph movement and drainage.

Intermittent Pneumatic Pumps

Intermittent pneumatic compression (IPC) pumps have emerged as an effective adjunct therapy for lymphedema management but do not replace CDT. Advances in IPC technology have improved outcomes, with modern devices featuring multiple chambers and providing sequential or peristaltic compression in an ascending pattern along the affected limb (Dunn et al., 2022).

The pressure settings during IPC treatment can vary. One study reported prescribing pressures of 80–120 mm Hg, resulting in a 75% mean reduction in edema. Another study recommended treatment pressures between 80–150 mm Hg, applied for 45–60 minutes daily for lower limb. Research conducted by Taradaj et al. demonstrated that combining IPC with manual lymphatic drainage (MLD) and multi-layer bandaging produced the most significant limb volume reduction. Specifically, treatment pressures of 120 mm Hg resulted in a 38% reduction in edema compared to 60 mm Hg pressure (13% reduction) or MLD and bandaging alone (13% reduction).

Surgical Interventions

Surgical techniques for managing lymphedema are continually advancing, offering promising outcomes, reduced pain, and improved quality of life. However, there remains no definitive cure for lymphedema, and effective management remains essential.

CLINICS CARE POINTS—LYMPHEDEMA

- The use of diuretics to reduce edema in patients with lymphatic dysfunction is not recommended. According to Farrow (2010), diuretics increase protein concentration in the interstitial space, exacerbating the inflammatory process and resulting in irreversible skin and soft tissue changes.
- Unilateral or bilateral asymmetrical swelling of the extremities is a common physical characteristic of lymphedema.
- Complete decongestive therapy (CDT), delivered by a certified clinician, remains the gold-standard treatment for lymphedema management.

Conclusion

Chronic venous insufficiency and lymphedema are interconnected conditions that impair fluid balance and wound healing, significantly impacting patient outcomes and quality of life. Nurses play a central role in recognizing early signs, managing symptoms, and coordinating multidisciplinary care. Through interventions such as compression therapy, wound hygiene, and patient education, nurses facilitate edema reduction, improve tissue perfusion, and promote effective wound healing. Addressing underlying venous and lymphatic dysfunctions with tailored strategies is critical to preventing complications, reducing healthcare costs, and enhancing patient well-being. Moving forward, empowering nurses with advanced education and resources will further strengthen their ability to lead in wound care management and improve long-term outcomes for individuals affected by these challenging conditions.

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