

Chronic Venous Insufficiency: An Updated Review for Nursing

Laila Mohammed Hassan Alserhri¹, Hanan Mohammed Hassan Alshehri², Jawaher Mohammed Hassan Alshehri³, Halimah Ahmed Mohammed Asiri⁴, Reem Ahmad Mohammad Asiri⁵, Amal Talea Abdullah Asiri⁶, Aishah Hezam Rajeh Alshehry⁷, Damsah Lbrhim Abud Asiry⁸, Agil Atef A Albargi⁹, Khulud Ali Mohammed Alshehri¹⁰, Mohammed Abu Bakar Albarqi¹¹, Saeed Hadi Hamad Alqahtani¹², Abeer Yahya Mohammad Al Nawshan¹³, Ahlam Abdulrhma Ali Alasmari¹⁴, Alya Mohammed Ali Alshehri¹⁵

Abstract

Background: Chronic venous disease (CVD) is a prevalent condition characterized by structural and functional abnormalities of the venous system, primarily affecting the lower extremities. It manifests through symptoms such as leg heaviness, swelling, varicose veins, and venous ulcers, significantly impacting patients' quality of life and imposing substantial economic burdens on healthcare systems. The pathophysiology involves venous hypertension, inflammation, and valve incompetence, with risk factors including age, obesity, pregnancy, and genetic predisposition. Aim: This review aims to provide an updated overview of CVD, focusing on its etiology, epidemiology, pathophysiology, clinical evaluation, and management strategies. It emphasizes the role of nursing interventions and the importance of an interprofessional approach to optimize patient outcomes. Methods: The review synthesizes current literature on CVD, including diagnostic criteria, treatment modalities, and nursing protocols. It highlights evidence-based practices such as compression therapy, wound care, lifestyle modifications, and minimally invasive procedures like sclerotherapy and endovenous ablation. The role of the CEAP classification and Venous Clinical Severity Score (VCSS) in guiding treatment decisions is also discussed. Results: CVD management requires a multidisciplinary approach, with compression therapy and lifestyle modifications forming the foundation of treatment. Minimally invasive procedures and surgical interventions are effective for advanced cases. Nursing interventions, including patient education, wound care, and pain management, play a critical role in improving outcomes. Early diagnosis and adherence to treatment plans are essential to prevent complications such as venous ulcers, deep vein thrombosis, and cellulitis. Conclusion: Effective management of CVD relies on a combination of conservative measures, advanced therapies, and patient education. An interprofessional team approach, including nurses, physicians, and specialists, is crucial for optimizing care and reducing the burden of this chronic condition.

Keywords: *Chronic venous disease, venous insufficiency, compression therapy, venous ulcers, nursing interventions, interprofessional care.*

¹ Ksa, Ministry Of Health, Bariq Health Sector

² Ksa, Ministry Of Health, Wadialkhair Health Care Center

³ Ksa, Ministry Of Health, Alqreeha Health Care Center

⁴ Ksa, Ministry Of Health, Saaban Health Care Center

⁵ Ksa, Ministry Of Health, Saaban Health Care Center

⁶ Ksa, Ministry Of Health, Saaban Health Care Center

⁷ Ksa, Ministry Of Health, Thloothalnzr Health Care Center

⁸ Ksa, Ministry Of Health, Thloothalnzr Health Care Center

⁹ Ksa, Ministry Of Health, Bariq Health Sector

¹⁰ Ksa, Ministry Of Health, Alqreeha Health Care Center

¹¹ Ksa, Ministry Of Health, Bariq Health Sector

¹² Ksa, Ministry Of Health, Dhahran Al Janoub General Hospital

¹³ Ksa, Ministry Of Health, Aseer Health Cluster

¹⁴ Ksa, Ministry Of Health, Muhayil Health Care Center

¹⁵ Ksa, Ministry Of Health, Alburaid Health Care Center

Introduction

Chronic venous disease (CVD) is a medical condition defined by structural and functional abnormalities of the venous system, primarily affecting the lower extremities. It manifests through symptoms such as leg heaviness, aching, swelling, telangiectasia, and varicose veins. The primary pathophysiological mechanism of CVD involves persistent ambulatory venous hypertension, which triggers inflammation and leads to venous dysfunction. It is estimated that more than 2.5 million individuals in the United States are affected by CVD, with approximately 20% of these patients developing venous ulcers, a severe and debilitating complication of the disease [1]. CVD and its associated chronic venous ulcers are linked to a poor prognosis, significantly limiting patients' ability to engage in occupational and social activities. This results in a diminished quality of life and imposes substantial financial burdens on affected individuals. The condition is a major contributor to work-related disability, with an estimated 2 million workdays lost annually due to complications arising from venous ulcers. Additionally, more than 12% of workers with venous ulcers are forced to retire prematurely, underscoring the profound impact of the disease on workforce productivity and economic stability [2]. The economic impact of venous ulcers on the healthcare system is considerable, with chronic wound management alone costing an estimated 3 billion [3]. These figures highlight the significant economic and social challenges posed by CVD and its complications, emphasizing the urgent need for effective management strategies, preventive measures, and improved treatment options to reduce the burden on patients and healthcare systems.

Etiology

The etiology of chronic venous disease (CVD) remains incompletely understood, though it is widely acknowledged to involve a combination of genetic, environmental, and lifestyle factors. A hereditary component is strongly suggested, as genetic disorders such as Klippel-Trenaunay syndrome and Parkes-Weber syndrome are known to contribute to the development of CVD [4]. These conditions highlight the role of genetic predisposition in the structural and functional abnormalities of the venous system. However, beyond genetic influences, a variety of risk factors have been identified that increase the likelihood of developing CVD. These include advancing age, female sex, and obesity, which are among the most commonly cited contributors. Hormonal factors, such as the use of oral contraceptives and pregnancy, also play a significant role, particularly in women. Additionally, lifestyle choices such as tobacco use and prolonged periods of standing or sitting have been linked to the onset and progression of CVD. A family history of varicose veins further underscores the genetic predisposition to the disease, while a personal history of deep vein thrombosis, thrombophlebitis, or leg injury can exacerbate venous dysfunction. These risk factors collectively contribute to the development of venous hypertension, inflammation, and the subsequent clinical manifestations of CVD. Understanding these risk factors is crucial for both prevention and management, as they provide insights into the multifaceted nature of the disease and highlight the need for targeted interventions to mitigate its impact.

Epidemiology

Chronic venous disease (CVD) exhibits a distinct epidemiological pattern, with its prevalence and risk factors varying significantly across different populations. One of the most notable trends is the strong correlation between advancing age and the increased risk of developing CVD. As individuals grow older, the likelihood of experiencing venous dysfunction rises substantially, making age one of the most significant risk factors for the disease. Additionally, CVD demonstrates a clear gender disparity, with a female-to-male predominance ratio of approximately 3 to 1 [5]. This heightened prevalence among women is often attributed to hormonal influences, particularly those related to pregnancy and the use of oral contraceptives, which can exacerbate venous insufficiency. The Framingham study, a landmark research effort, provided valuable insights into the incidence rates of CVD, reporting an annual incidence of 2.6% in women and 1.9% in men [6]. These findings underscore the higher susceptibility of women to the condition. Furthermore, the prevalence of varicose veins, a common manifestation of CVD, is notably higher in industrialized and developed nations compared to underdeveloped regions. This disparity is likely influenced by lifestyle factors such as sedentary behavior, obesity, and prolonged periods of standing or

sitting, which are more prevalent in developed societies. The combination of these factors contributes to the increased burden of CVD in these regions, highlighting the need for targeted public health interventions to address modifiable risk factors and reduce the overall prevalence of the disease. Understanding these epidemiological trends is essential for developing effective prevention and management strategies to mitigate the impact of CVD on global health.

Pathophysiology

The pathophysiology of chronic venous disease (CVD) is rooted in the dysfunction of the peripheral venous system, which plays a critical role in maintaining blood circulation. The peripheral venous system acts as a reservoir for blood and facilitates its return to the heart. For this system to function effectively, the integrity of blood vessels, venous valves, and muscle pumps is essential. In the upright position, blood must overcome gravitational and other pressures to return to the central circulation. The veins of the lower extremities are categorized into three types: superficial veins, which lie above the fascial muscle layer; deep veins, located below the fascial layer; and perforator veins, which connect the superficial and deep systems [7]. The superficial venous system includes the great saphenous vein (GSV), the small saphenous vein, and several accessory veins. The deep venous system comprises axial veins, while perforator veins bridge the superficial and deep systems by traversing the fascial layer. Both deep and superficial veins contain one-way bicuspid valves that ensure blood flows toward the heart and prevent retrograde flow back to the feet [5]. When these valves become incompetent or other structural abnormalities occur, venous pressure increases, leading to impaired blood return.

Several mechanisms contribute to the development of venous disease, including valvular incompetence, venous obstruction (thrombotic or non-thrombotic), and extrinsic compression of veins. These issues are often exacerbated by dysfunctional muscle pumps, particularly in the calf muscles, which are crucial for promoting venous return during movement. These pathological changes result in localized or systemic venous hypertension, especially during standing or walking. Over time, persistent venous hypertension can cause significant complications, such as skin hyperpigmentation, lipodermatosclerosis (a condition affecting the subcutaneous tissue), and, ultimately, venous ulceration [5]. The weakening of venous valves can arise from preexisting vascular wall weakness, superficial phlebitis, or excessive venous distention due to hormonal influences, particularly in the superficial system. In contrast, deep vein valve dysfunction is often associated with deep vein thrombosis (DVT) or venous stenosis. These structural and functional abnormalities collectively contribute to the progression of CVD, highlighting the complex interplay of factors that underline its pathophysiology. Understanding these mechanisms is critical for developing targeted therapeutic interventions to manage and mitigate the effects of chronic venous disease.

History and Physical

Chronic venous insufficiency (CVI) presents with a range of clinical manifestations that can significantly impact a patient's quality of life. The most common signs include dilated veins, such as telangiectasias (spider veins), reticular veins, and varicose veins. Varicose veins are particularly notable, as they are dilated, tortuous superficial veins that become increasingly prominent and convoluted over time. Patients often report symptoms such as leg edema, pain, achiness, and a sensation of heaviness, particularly after prolonged standing or sitting. Skin changes are also a hallmark of CVI, including hyperpigmentation due to hemosiderin deposition, eczematous dermatitis, and lipodermatosclerosis, a condition characterized by fibrosis of the dermis and subcutaneous fat. Venous ulcers, which typically occur on the medial surface above the malleolus, are a severe complication of CVI and are often associated with an increased risk of cellulitis and superficial thrombophlebitis [8]. The edema associated with CVI usually begins in the peri-malleolar region and progresses upward in a dependent manner. It is typically pitting in nature and spares the forefoot. In cases where the deep venous system is occluded, patients may experience venous claudication, a condition characterized by pain during walking that improves with rest. These clinical features highlight the progressive nature of CVI and its potential to cause significant morbidity if left untreated.

To standardize the diagnosis and treatment of CVI, the Clinical, Etiology, Anatomic, and Pathophysiology (CEAP) classification system was developed through an international consensus conference. This system provides a comprehensive framework for categorizing the clinical manifestations, underlying causes, anatomical involvement, and pathophysiological mechanisms of CVI [8]. Complementing the CEAP classification, the revised Venous Clinical Severity Score (VCSS) offers a more detailed assessment of disease severity and has broader clinical utility. The VCSS is particularly valuable for evaluating the effectiveness of treatments for chronic venous disease and is recommended for routine clinical use, with a 1B grade of evidence [10][11]. The combination of the CEAP classification and the VCSS allows healthcare providers to better understand the severity of CVI, tailor treatment plans to individual patients, and monitor therapeutic outcomes more effectively. These tools are essential for improving the consistency and quality of care for patients with CVI, ultimately leading to better clinical outcomes and enhanced patient satisfaction.

CEAP Classification

The CEAP (Clinical, Etiology, Anatomic, and Pathophysiology) classification system is a standardized framework used to categorize and describe chronic venous disease (CVD) based on its clinical presentation, underlying causes, anatomical involvement, and pathophysiological mechanisms. This system provides a comprehensive and systematic approach to diagnosing and managing venous disorders, ensuring consistency in reporting and treatment.

Clinical Classification

The clinical component of the CEAP system categorizes the visible and palpable signs of venous disease into seven classes:

- **C0:** No visible or palpable signs of venous disease.
- **C1:** Presence of telangiectasias (spider veins) or reticular veins.
- **C2:** Varicose veins, which are dilated, tortuous superficial veins.
- **C3:** Edema typically presented as swelling in the lower extremities.
- **C4a:** Skin changes such as pigmentation (hyperpigmentation due to hemosiderin deposition) and/or eczema.
- **C4b:** Advanced skin changes, including lipodermatosclerosis (fibrosis of the skin and subcutaneous tissue) and/or atrophy blanche (white, scar-like patches).
- **C5:** Healed venous ulcer, indicating a history of ulceration that has resolved.
- **C6:** Active venous ulcer, representing the most severe clinical manifestation of chronic venous insufficiency (CVI).

Etiologic Classification

The etiologic component identifies the underlying cause of the venous disease:

- **Ec:** Congenital, referring to venous abnormalities present from birth.
- **Ep:** Primary, indicating venous disease with no identifiable cause.
- **Es:** Secondary, resulting from acquired conditions such as deep vein thrombosis (DVT) or trauma.

- **En:** No venous etiology identified, used when the cause of venous disease is unknown.

Anatomic Classification

The anatomic component specifies the location of venous involvement:

- **As:** Superficial veins, including the great saphenous vein (GSV) and small saphenous vein.
- **Ap:** Perforator veins, which connect the superficial and deep venous systems.
- **Ad:** Deep veins, such as the femoral and popliteal veins.
- **An:** No identifiable venous location.

Pathophysiologic Classification

The pathophysiologic component describes the functional abnormalities contributing to venous disease:

- **Pr:** Reflux, indicating venous valve incompetence leading to backward blood flow.
- **P0:** Obstruction, caused by venous blockage due to thrombosis or other factors.
- **Pr/o:** Combined reflux and obstruction.
- **Pn:** No identifiable venous pathophysiology.

The CEAP classification system, along with tools like the revised Venous Clinical Severity Score (VCSS), enhances the ability of clinicians to assess the severity of venous disease, guide treatment decisions, and evaluate therapeutic outcomes. This systematic approach ensures a more accurate and consistent management of chronic venous disorders, ultimately improving patient care.

Evaluation

The evaluation of chronic venous disease (CVD) requires a comprehensive and systematic approach, combining a detailed history, physical examination, and noninvasive diagnostic tests. Invasive testing is generally reserved for complex cases or when surgical intervention is being considered. The initial assessment begins with a thorough history to identify risk factors such as age, gender, family history, prolonged standing or sitting, obesity, pregnancy, and a history of deep vein thrombosis (DVT) or trauma. Patients often report symptoms such as leg heaviness, pain, swelling, and fatigue, particularly after prolonged periods of standing or sitting. A physical examination is then conducted, preferably with the patient in an upright position, to inspect the skin for visible signs of venous disease, including telangiectasias (spider veins), reticular veins, varicose veins, and their distribution. The skin should also be evaluated for hyperpigmentation, stasis dermatitis, atrophie blanche, lipodermatosclerosis, and the presence of active or healed venous ulcers, typically located above the medial malleolus. The Brodie-Trendelenburg test, a standard tourniquet test, can be performed at the bedside to differentiate between deep and superficial venous reflux. Additionally, a handheld continuous-wave Doppler can be used to assess venous flow and valve competence during the physical examination [12].

Noninvasive testing plays a central role in the evaluation of CVD, with venous duplex imaging being the most widely used and recommended diagnostic tool. Venous duplex combines B-mode ultrasound imaging of the deep and superficial veins with pulsed Doppler assessment of blood flow direction using provocative maneuvers such as the Valsalva maneuver or manual compression. This technique provides detailed information about the anatomy, valve function, and presence of reflux or obstruction in the venous system [5]. Another valuable noninvasive test is air plethysmography (APG), which assesses global venous function

by measuring venous filling indices, ejection fraction, and residual volume. APG is particularly useful for evaluating reflux, obstruction, and muscle pump failure, and it can help determine the severity of chronic venous insufficiency (CVI) and guide treatment decisions [13][14][15]. When venous duplex imaging is inconclusive, APG can provide additional diagnostic insights. Other noninvasive techniques include photoplethysmography, strain gauge plethysmography, and foot volumetry, which measure changes in blood volume and flow in the lower extremities. In cases where noninvasive tests fail to provide definitive results or when complex venous anatomy needs to be characterized, advanced imaging modalities such as computed tomography (CT) venography and magnetic resonance (MR) venography may be employed. These techniques require intravenous contrast material and are particularly useful for evaluating proximal veins, such as the iliac and femoral veins, and identifying intrinsic or extrinsic compression. They are often used to assess iliofemoral venous obstruction or to plan interventions for complex venous reconstructions [5].

Invasive diagnostic tests are reserved for specific clinical scenarios. Contrast venography, though less commonly used today, remains valuable for identifying reflux at the saphenofemoral junction or common femoral vein and is sometimes employed in preoperative planning for venous reconstruction. Intravascular ultrasound (IVUS) is a catheter-based technique that provides high-resolution images of the venous lumen and surrounding structures, making it particularly useful for detecting venous stenosis or obstruction. Ambulatory venous pressure (AVP) measurement, considered the gold standard for assessing venous hemodynamics, involves inserting a needle into a dorsal foot vein and connecting it to a pressure transducer. While AVP provides valuable information about the severity of CVI and its clinical outcomes, its invasive nature and the availability of alternative diagnostic modalities have limited its routine use [16]. In summary, the evaluation of chronic venous disease involves a stepwise approach, beginning with a thorough history and physical examination, followed by noninvasive tests such as venous duplex imaging and air plethysmography. Advanced imaging techniques like CT and MR venography are used for complex cases, while invasive tests such as contrast venography, IVUS, and AVP measurement are reserved for specific clinical scenarios. This comprehensive diagnostic approach ensures accurate assessment, guides treatment decisions, and improves patient outcomes.

Nursing Diagnosis

Nursing diagnoses for patients with chronic venous disease (CVD) focus on addressing the physical, emotional, and functional challenges associated with the condition. One common nursing diagnosis is Impaired Skin Integrity, related to venous stasis, edema, and poor circulation, which can lead to skin changes such as hyperpigmentation, lipodermatosclerosis, and venous ulcers. Nurses prioritize wound care, compression therapy, and patient education on skin protection to prevent further damage and promote healing. Another key diagnosis is Ineffective Peripheral Tissue Perfusion, related to venous hypertension and impaired blood flow. This is addressed through interventions such as leg elevation, compression stockings, and encouraging regular physical activity to improve venous return and reduce edema. Chronic Pain is another frequent nursing diagnosis, associated with venous congestion, inflammation, and ulceration. Nurses manage this by administering prescribed analgesics, promoting rest, and teaching patients about non-pharmacological pain relief methods such as elevation and gentle exercise. Activity Intolerance may also be identified, related to leg heaviness, pain, and swelling. Nurses assist patients in developing a balanced activity plan that includes gradual increases in mobility while avoiding prolonged standing or sitting. Additionally, Risk for Infection is a critical diagnosis due to the potential for venous ulcers and skin breakdown. Nurses emphasize proper wound care, hygiene, and monitoring for signs of infection such as redness, warmth, or discharge. Lastly, Deficient Knowledge regarding disease management and prevention is often identified. Nurses provide education on lifestyle modifications, such as weight management, smoking cessation, and the importance of compression therapy, to empower patients in managing their condition effectively. These nursing diagnoses and interventions aim to improve patient outcomes, enhance quality of life, and prevent complications associated with chronic venous disease [16].

Treatment and Management of Chronic Venous Insufficiency (CVI)

The management of chronic venous insufficiency (CVI) involves a combination of conservative measures, minimally invasive procedures, and surgical interventions. The choice of treatment depends on the severity of the disease, the patient's symptoms, and the underlying pathophysiology. Conservative therapies are typically the first line of treatment, while advanced interventions are reserved for more severe or refractory cases.

Conservative Management

Compression Therapy: Compression therapy is the cornerstone of CVI management. It involves the use of graduated compression stockings or bandages to apply external pressure to the lower extremities, counteracting venous hypertension and improving venous return. Compression garments, such as elastic stockings, gauze boots, layered bandages, and adjustable compression devices, are commonly used. A compression pressure of 30-50 mm Hg has been shown to significantly improve symptoms such as pain, edema, and skin pigmentation, with a compliance rate of 70-80% [17]. Compression therapy is also effective in healing venous ulcers and preventing their recurrence.

Lifestyle Modifications: Obesity is a well-established risk factor for CVI, and weight management is crucial in alleviating symptoms. Studies have shown that weight loss, particularly after bariatric surgery, can lead to significant improvements in CVI symptoms, including reduced edema and ulceration [18]. Patients are encouraged to maintain a healthy weight through diet and exercise, which can also enhance overall venous function.

Skin and Wound Care: Advanced CVI often leads to skin changes and ulceration, making skin care a critical component of management. Topical moisturizers containing lanolin can help prevent skin fissuring and disintegration. For stasis dermatitis, topical steroids may be used to reduce inflammation. Venous ulcers require diligent wound care to prevent infection and promote healing. Hydrocolloid and foam dressings are commonly used to manage wound drainage and prevent skin maceration. Biologic skin replacements and silver-impregnated dressings have shown some efficacy in treating ulcers, although their use remains controversial [19].

Minimally Invasive Procedures

Sclerotherapy: Sclerotherapy is a minimally invasive procedure used to treat telangiectasias, reticular veins, and small varicose veins (1-4 mm in diameter). It involves injecting a sclerosing agent, such as hypertonic saline, polidocanol, or sodium tetradecyl sulfate, into the affected veins to cause fibrosis and closure. Polidocanol has been shown to be particularly effective in eliminating incompetent veins and improving venous hemodynamics [20]. A common side effect of sclerotherapy is skin darkening due to hemosiderin deposition, which can be mitigated by microthrombectomy.

Endovenous Ablative Therapy: Endovenous ablation is a minimally invasive technique used to treat incompetent veins, particularly the great saphenous vein (GSV). It involves the use of thermal energy, either through radiofrequency or laser, to induce fibrosis and closure of the affected vein. Radiofrequency ablation has a success rate of 85% in achieving complete vein obliteration after two years, while laser therapy using an 810-nm or 940-nm diode has shown even better outcomes, with a 93% success rate [21]. Both procedures are performed under tumescent anesthesia to minimize discomfort and reduce the risk of complications such as skin burns, deep vein thrombosis (DVT), and pulmonary embolism.

Endovenous Deep System Therapy: For patients with iliac vein stenosis or occlusion, endovascular stenting has largely replaced traditional surgical techniques. Stenting is effective in restoring venous patency and improving symptoms, with a low restenosis rate of approximately 5% [5]. Long-term outcomes are favorable, with 85-90% of patients remaining free of recurrent ulcers after five years [22].

Surgical Management

Surgical intervention is considered for patients who do not respond to conservative or minimally invasive treatments, particularly those with severe symptoms, recurrent varicose veins, or non-healing venous ulcers. Surgical options include:

- **Ligation and Stripping:** This procedure involves removing the affected vein, typically the GSV, through small incisions. High ligation at the saphenofemoral junction is often performed to prevent reflux. Ligation and stripping have been shown to improve venous hemodynamics, alleviate pain, and promote ulcer healing.
- **Venous Valve Reconstruction:** For patients with deep venous valve incompetence, surgical techniques such as valvuloplasty, vein transposition, or vein transplantation may be considered. Cryopreserved vein valve allografts and neo-valve construction are also options for restoring valve function.

The management of CVI requires a multidisciplinary approach tailored to the patient's specific needs. Conservative measures, such as compression therapy and lifestyle modifications, form the foundation of treatment. Minimally invasive procedures, including sclerotherapy and endovenous ablation, offer effective alternatives for patients with more advanced disease. Surgical interventions are reserved for refractory cases or those with complex venous pathology. By combining these strategies, healthcare providers can effectively manage CVI, improve patient outcomes, and enhance quality of life.

Differential Diagnosis

The differential diagnosis of chronic venous insufficiency (CVI) includes a wide range of conditions that can present similar symptoms, such as lower extremity swelling, pain, and skin changes. Acute deep vein thrombosis (DVT) is a critical condition to rule out, as it shares symptoms like leg swelling and pain but requires urgent treatment to prevent complications such as pulmonary embolism. Heart failure can also cause bilateral lower extremity edema due to fluid retention, often accompanied by other signs like shortness of breath and fatigue. Cirrhosis and renal failure are systemic conditions that can lead to peripheral edema due to hypoalbuminemia and fluid overload, respectively. Endocrine disorders, such as hypothyroidism, may present with generalized edema and skin changes, mimicking CVI. Certain medications, including calcium channel blockers, NSAIDs, and oral hypoglycemic agents, can cause lower extremity swelling as a side effect. Lymphedema, characterized by impaired lymphatic drainage, results in persistent, non-pitting edema and skin thickening, often affecting one limb. Lipedema, a condition primarily affecting women, involves symmetrical fat deposition in the legs, often mistaken for CVI due to swelling and discomfort. Localized conditions such as a ruptured popliteal cyst (Baker's cyst) can cause sudden calf swelling and pain, mimicking venous symptoms. A soft tissue hematoma or mass may also present with localized swelling and tenderness. Exertional compartment syndrome, often seen in athletes, causes pain and swelling during physical activity due to increased pressure within muscle compartments. Lastly, a gastrocnemius tear can lead to acute calf pain and swelling, resembling symptoms of venous disease. Accurate diagnosis requires a thorough clinical evaluation, imaging studies, and laboratory tests to distinguish CVI from these conditions.

Complications

Untreated chronic venous disease (CVD) can lead to a range of complications that significantly impact a patient's quality of life and overall health. One of the most severe complications is chronic venous ulceration, which typically occurs above the medial malleolus and is often difficult to heal due to persistent venous hypertension and poor tissue perfusion. These ulcers are prone to infection and can lead to recurrent episodes of cellulitis, further complicating the condition. Another serious complication is deep vein thrombosis (DVT), which can arise from chronic venous stasis and inflammation, increasing the risk of life-threatening pulmonary embolism. Lipodermatosclerosis, a fibrotic condition affecting the skin and subcutaneous tissue, is another common complication of untreated CVD. It causes hardening and tightening of the skin, leading to discomfort and restricted mobility. Over time, chronic venous insufficiency can also result in secondary lymphedema, as the lymphatic system becomes overwhelmed by

the persistent fluid overload. Stasis dermatitis, characterized by skin inflammation, redness, and scaling, is another frequent complication that can progress to more severe skin changes if left untreated. Patients with CVD often experience chronic pain and discomfort, which can limit their ability to perform daily activities and reduce their quality of life. Superficial thrombophlebitis, inflammation of superficial veins due to blood clots, is another potential complication that can cause localized pain and swelling. In severe cases, secondary hemorrhage may occur from fragile, ulcerated skin or varicose veins. Atrophie blanche, characterized by white, scar-like patches on the skin, is a sign of advanced disease and poor healing. Additionally, chronic scarring and fibrosis around the ankle joint can lead to ankle joint stiffness, further impairing mobility and function. These complications highlight the importance of early diagnosis and effective management of chronic venous disease to prevent long-term morbidity [23].

Patient Education

Patient education is a critical component of managing chronic venous disease (CVD) and preventing its complications. Patients should be thoroughly instructed on the proper use of compression stockings, including the importance of wearing them consistently and ensuring they provide the optimal tension gradient (typically 30-50 mm Hg). Compression stockings are effective in reducing discomfort, edema, and venous distension, as well as promoting the healing of venous ulcers and preventing their recurrence. Patients should also be educated on the importance of skin care to maintain skin integrity. This includes regularly inspecting the skin for signs of breakdown or infection, applying moisturizers to prevent fissuring, and promptly addressing any wounds or changes in skin condition. Elevating the legs above heart level for 15-30 minutes several times a day can help minimize swelling and improve venous return. Additionally, patients should avoid prolonged periods of standing or sitting, as these can exacerbate venous hypertension and symptoms. Weight management is another key aspect of patient education. Patients should be encouraged to achieve and maintain an ideal body weight, as obesity is a significant risk factor for CVD progression. Identifying and addressing barriers to weight loss, such as psychiatric conditions (e.g., depression, anxiety, or eating disorders), medications that cause weight gain, or mobility issues (e.g., knee osteoarthritis), is essential. Referrals to specialists, such as dietitians, mental health professionals, or physical therapists, may be necessary to support patients in their weight management efforts. Finally, patients should be made aware that CVD is a chronic condition requiring long-term management. Regular follow-up with healthcare providers and adherence to prescribed treatment plans are crucial for preventing complications such as venous ulcers, deep vein thrombosis, and skin changes. Emphasizing the importance of compliance with medical advice and lifestyle modifications can empower patients to take an active role in managing their condition and improving their quality of life [23].

Enhancing Healthcare Team Outcomes

Enhancing healthcare outcomes for patients with chronic venous disease (CVD) necessitates a collaborative, interprofessional team approach. This team should include primary care physicians, vascular and general surgeons, wound care nurses, physical and occupational therapists, dietitians, weight management specialists, bariatric surgeons, and pharmacists. Each member plays a vital role in ensuring comprehensive care, from early diagnosis to long-term management. Primary care providers are often the first point of contact and are responsible for initiating diagnostic evaluations to rule out other causes of lower limb edema, such as heart failure, renal disease, or lymphedema. They should also avoid prescribing medications, such as calcium channel blockers or nonsteroidal anti-inflammatory drugs (NSAIDs), that may exacerbate venous symptoms. Pharmacists can contribute by reviewing the patient's medication regimen and recommending alternatives to minimize the risk of worsening the condition. Early referral to specialists, such as vascular surgeons, is critical for patients with severe or recurrent disease, particularly those with non-healing venous ulcers or complex venous anatomy. Wound care nurses and occupational therapists are essential in managing venous ulcers, providing specialized care to promote healing, and preventing complications such as infection. Physical therapists can assist patients in improving mobility and implementing exercises to enhance venous return. Dietitians and weight management teams play a crucial role in addressing obesity, a significant risk factor for CVD, by developing personalized weight loss plans. For patients who struggle with conservative weight loss methods, referral to a bariatric surgeon may be necessary, as weight reduction has been shown to significantly improve CVD symptoms and prevent disease

progression. Regular follow-up and patient education are critical to ensuring adherence to treatment plans and preventing recurrence. By fostering collaboration among healthcare professionals, the interprofessional team can optimize patient outcomes, improve quality of life, and reduce the burden of chronic venous disease [23].

Role of Nursing Intervention Protocols

Nursing intervention protocols play a pivotal role in the management of chronic venous disease (CVD), ensuring that patients receive comprehensive, evidence-based care tailored to their specific needs. Nurses are often at the forefront of patient care, providing education, monitoring, and direct interventions that are critical to improving outcomes and preventing complications. One of the primary responsibilities of nurses is to educate patients about the importance of compression therapy, including the proper use of compression stockings or bandages. They teach patients how to apply these garments correctly, emphasize the need for consistent use, and address any concerns or barriers to compliance. Nurses also monitor the skin for signs of irritation or breakdown caused by compression devices and adjust the treatment plan as needed. Another key aspect of nursing intervention is wound care management, particularly for patients with venous ulcers. Nurses assess the wound's size, depth, and characteristics, clean and dress the wound using appropriate materials such as hydrocolloids or foam dressings and monitor for signs of infection. They also educate patients on proper wound care techniques at home, including the importance of keeping the wound clean and dry. By providing consistent and skilled wound care, nurses help promote healing and reduce the risk of complications such as cellulitis or sepsis.

Nurses also play a vital role in patient education and lifestyle modification. They counsel patients on the importance of leg elevation, regular physical activity, and avoiding prolonged periods of standing or sitting to improve venous return and reduce edema. Nurses provide guidance on maintaining a healthy weight, which is crucial for managing CVD, and may collaborate with dietitians or weight management specialists to develop personalized plans. Additionally, they educate patients on recognizing early signs of complications, such as skin changes or ulcer formation, and encourage prompt reporting to healthcare providers. Pain management is another critical component of nursing interventions. Nurses assess the patient's pain levels, administer prescribed analgesics, and recommend non-pharmacological strategies such as leg elevation or gentle massage to alleviate discomfort. They also monitor the side effects of medications and adjust the pain management plan as needed. Finally, nurses facilitate coordination of care within the interprofessional team. They communicate patient progress, concerns, and needs to other healthcare providers, ensuring a seamless and integrated approach to treatment. By implementing these protocols, nurses enhance patient outcomes, improve quality of life, and reduce the burden of chronic venous disease.

Conclusion

Chronic venous disease (CVD) is a complex and multifaceted condition that significantly impacts patients' quality of life and poses considerable challenges to healthcare systems. This review underscores the importance of a comprehensive and interprofessional approach to managing CVD, emphasizing the critical role of nursing interventions in improving patient outcomes. Nurses are at the forefront of patient care, providing essential education on compression therapy, wound care, and lifestyle modifications, which are foundational to managing CVD. By teaching patients how to properly use compression stockings, maintain skin integrity, and recognize early signs of complications, nurses empower individuals to take an active role in their care. The pathophysiology of CVD, driven by venous hypertension, inflammation, and valve incompetence, highlights the need for targeted interventions. Conservative measures, such as compression therapy and weight management, are effective in alleviating symptoms and preventing disease progression. For more advanced cases, minimally invasive procedures like sclerotherapy and endovenous ablation offer promising results, while surgical interventions remain an option for refractory cases. The use of standardized tools such as the CEAP classification and Venous Clinical Severity Score (VCSS) ensures a systematic approach to diagnosis and treatment, enabling healthcare providers to tailor interventions to individual patient needs. Patient education is a cornerstone of CVD management, as it promotes adherence to treatment plans and fosters long-term self-care. Nurses play a pivotal role in educating patients about the importance of leg elevation, regular physical activity, and avoiding prolonged standing or sitting.

Additionally, addressing barriers to weight loss and providing emotional support are essential components of holistic care. The complications of untreated CVD, including chronic venous ulcers, deep vein thrombosis, and cellulitis, underscore the importance of early diagnosis and timely intervention. By fostering collaboration among healthcare professionals, including primary care physicians, vascular surgeons, wound care nurses, and dietitians, the interprofessional team can optimize patient outcomes and reduce the burden of this chronic condition. In conclusion, effective management of CVD requires a combination of evidence-based therapies, patient education, and a coordinated team approach. Nurses, as key members of the healthcare team, are instrumental in delivering high-quality care and improving the quality of life for patients with chronic venous disease.

References

- Rhodes JM, Gloviczki P, Canton LG, Rooke T, Lewis BD, Lindsey JR. Factors affecting clinical outcome following endoscopic perforator vein ablation. *Am J Surg*. 1998 Aug;176(2):162-7.
- Da Silva A, Navarro MF, Batalheiro J. [The importance of chronic venous insufficiency. Various preliminary data on its medico-social consequences]. *Phlebologie*. 1992 Nov-Dec;45(4):439-43.
- Pierce GF, Mustoe TA. Pharmacologic enhancement of wound healing. *Annu Rev Med*. 1995;46:467-81.
- Noel AA, Gloviczki P, Cherry KJ, Rooke TW, Stanson AW, Driscoll DJ. Surgical treatment of venous malformations in Klippel-Trénaunay syndrome. *J Vasc Surg*. 2000 Nov;32(5):840-7.
- Eberhardt RT, Raffetto JD. Chronic venous insufficiency. *Circulation*. 2014 Jul 22;130(4):333-46.
- Brand FN, Dannenberg AL, Abbott RD, Kannel WB. The epidemiology of varicose veins: the Framingham Study. *Am J Prev Med*. 1988 Mar-Apr;4(2):96-101.
- Caggiati A, Bergan JJ, Gloviczki P, Jantet G, Wendell-Smith CP, Partsch H., International Interdisciplinary Consensus Committee on Venous Anatomical Terminology. Nomenclature of the veins of the lower limbs: an international interdisciplinary consensus statement. *J Vasc Surg*. 2002 Aug;36(2):416-22.
- Porter JM, Moneta GL. Reporting standards in venous disease: an update. International Consensus Committee on Chronic Venous Disease. *J Vasc Surg*. 1995 Apr;21(4):635-45.
- Vasquez MA, Rabe E, McLafferty RB, Shortell CK, Marston WA, Gillespie D, Meissner MH, Rutherford RB., American Venous Forum Ad Hoc Outcomes Working Group. Revision of the venous clinical severity score: venous outcomes consensus statement: special communication of the American Venous Forum Ad Hoc Outcomes Working Group. *J Vasc Surg*. 2010 Nov;52(5):1387-96.
- Gloviczki P, Comerota AJ, Dalsing MC, Eklof BG, Gillespie DL, Gloviczki ML, Lohr JM, McLafferty RB, Meissner MH, Murad MH, Padberg FT, Pappas PJ, Passman MA, Raffetto JD, Vasquez MA, Wakefield TW., Society for Vascular Surgery. American Venous Forum. The care of patients with varicose veins and associated chronic venous diseases: clinical practice guidelines of the Society for Vascular Surgery and the American Venous Forum. *J Vasc Surg*. 2011 May;53(5 Suppl):2S-48S.
- Kakkos SK, Rivera MA, Matsagas MI, Lazarides MK, Robless P, Belcaro G, Geroulakos G. Validation of the new venous severity scoring system in varicose vein surgery. *J Vasc Surg*. 2003 Aug;38(2):224-8.
- Folse R, Alexander RH. Directional flow detection for localizing venous valvular incompetency. *Surgery*. 1970 Jan;67(1):114-21.
- Christopoulos D, Nicolaides AN, Szendro G. Venous reflux: quantification and correlation with the clinical severity of chronic venous disease. *Br J Surg*. 1988 Apr;75(4):352-6.
- Gillespie DL, Cordts PR, Hartono C, Woodson J, Obi-Tabot E, LaMorte WW, Menzoian JO. The role of air plethysmography in monitoring results of venous surgery. *J Vasc Surg*. 1992 Nov;16(5):674-8.
- Owens LV, Farber MA, Young ML, Carlin RE, Criado-Pallares E, Passman MA, Keagy BA, Marston WA. The value of air plethysmography in predicting clinical outcome after surgical treatment of chronic venous insufficiency. *J Vasc Surg*. 2000 Nov;32(5):961-8.
- Nicolaides AN, Zukowski AJ. The value of dynamic venous pressure measurements. *World J Surg*. 1986 Dec;10(6):919-24.
- Motykie GD, Caprini JA, Arcelus JJ, Reyna JJ, Overom E, Mokhtee D. Evaluation of therapeutic compression stockings in the treatment of chronic venous insufficiency. *Dermatol Surg*. 1999 Feb;25(2):116-20.
- Sugerman HJ, Sugerman EL, Wolfe L, Kellum JM, Schweitzer MA, DeMaria EJ. Risks and benefits of gastric bypass in morbidly obese patients with severe venous stasis disease. *Ann Surg*. 2001 Jul;234(1):41-6.
- Karlsmark T, Agerslev RH, Bendz SH, Larsen JR, Roed-Petersen J, Andersen KE. Clinical performance of a new silver dressing, Contreet Foam, for chronic exuding venous leg ulcers. *J Wound Care*. 2003 Oct;12(9):351-4.
- Kahle B, Leng K. Efficacy of sclerotherapy in varicose veins— prospective, blinded, placebo-controlled study. *Dermatol Surg*. 2004 May;30(5):723-8; discussion 728.
- Min RJ, Khilnani N, Zimmet SE. Endovenous laser treatment of saphenous vein reflux: long-term results. *J Vasc Interv Radiol*. 2003 Aug;14(8):991-6.
- Raju S, Darcey R, Neglén P. Unexpected major role for venous stenting in deep reflux disease. *J Vasc Surg*. 2010 Feb;51(2):401-8; discussion 408.
- Singh, A., & Zahra, F. (2023). Chronic venous insufficiency. In StatPearls [Internet]. StatPearls Publishing.

القصور الوريدي المزمن: مراجعة محدثة للمريض

الخلفية: يعد المرض الوريدي المزمن (CVD) حالة شائعة تتميز بحدوث اضطرابات هيكلية ووظيفية في الجهاز الوريدي، مما يؤثر بشكل رئيسي على الأطراف السفلية. يظهر المرض من خلال أعراض مثل ثقل الساقين، والتورم، والدوالي، والتقرحات الوريدية، مما يؤثر بشكل كبير على جودة حياة المرضى ويشكل عبئاً اقتصادياً كبيراً على أنظمة الرعاية الصحية. تنطوي الفيزيولوجيا المرضية على ارتفاع ضغط الدم الوريدي، والالتهاب، وقصور الصمامات، وتزيد عوامل مثل العمر، والسمنة، والحمل، والاستعداد الوراثي من خطر الإصابة.

الهدف: تهدف هذه المراجعة إلى تقديم نظرة محدثة حول المرض الوريدي المزمن، مع التركيز على أسبابه، وانتشاره، وآلياته المرضية، وتقييمه السريري، واستراتيجيات علاجه. كما تؤكد على دور التدخلات التمريضية وأهمية النهج متعدد التخصصات لتحسين نتائج المرضى.

المنهجية: تستعرض هذه المراجعة الأدبيات الحالية حول المرض الوريدي المزمن، بما في ذلك معايير التشخيص، وطرق العلاج، والبروتوكولات التمريضية. تسلط الضوء على الممارسات المستندة إلى الأدلة مثل العلاج بالضغط، والعناية بالجروح، وتعديلات نمط الحياة، والإجراءات طفيفة التوغل مثل التصلب الوريدي والاستئصال الوريدي بالليزر أو الترددات الراديوية. كما تتم مناقشة دور تصنيف **CEAP** ونظام **Venous Clinical Severity Score (VCSS)** في توجيه قرارات العلاج.

النتائج: يتطلب علاج المرض الوريدي المزمن نهجاً متعدد التخصصات، حيث يشكل العلاج بالضغط وتعديلات نمط الحياة الركيزة الأساسية للعلاج. تعد الإجراءات طفيفة التوغل والتدخلات الجراحية فعالة في الحالات المتقدمة. تلعب التدخلات التمريضية، بما في ذلك تثقيف المرضى، والعناية بالجروح، وإدارة الألم، دوراً حاسماً في تحسين النتائج. يساعد التشخيص المبكر والالتزام بخطط العلاج في الوقاية من المضاعفات مثل التقرحات الوريدية، والتخثر الوريدي العميق، والتهاب النسيج الخلوي.

الاستنتاج: يعتمد العلاج الفعال للمرض الوريدي المزمن على مزيج من التدابير المحافظة، والعلاجات المتقدمة، وتثقيف المرضى. يعد النهج القائم على العمل الجماعي بين المرضى والأطباء والمتخصصين أمراً أساسياً لتحسين الرعاية وتقليل عبء هذا المرض المزمن.

الكلمات المفتاحية: المرض الوريدي المزمن، القصور الوريدي، العلاج بالضغط، التقرحات الوريدية، التدخلات التمريضية، الرعاية متعددة التخصصات.