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Screening for lower extremity venous disease

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ABSTRACT

Chronic venous disease (CVD) is frequently found in the general population. However, CVD is often overlooked by both healthcare providers and patients due to an underappreciation of the magnitude and impact of this condition. The importance of CVD relates to its prevalence, the natural history of the disease, and the socioeconomic impact of its manifestations. The aim of this article is to improve awareness of lower extremity venous disease and encourage screening to identify undiagnosed CVD and to identify patients at earlier stages of disease to prevent progression to more advanced states at the time of initial diagnosis.

1. Introduction

Chronic venous disease (CVD) of the lower extremities is frequently found in the general population [1–6]. However, CVD is often overlooked by both healthcare providers and patients due to an underappreciation of the magnitude and impact of this condition. The importance of CVD relates to its prevalence, the natural history of the disease, and the socioeconomic impact of its manifestations. The aim of this article is to improve awareness of lower extremity venous disease and encourage screening to identify undiagnosed CVD and to identify patients at earlier stages of disease to prevent progression to more advanced states at the time of initial diagnosis.

CVD of the lower extremities most commonly results from primary superficial venous incompetence and less often from deep venous reflux, residual obstruction and reflux following prior deep venous thrombosis (DVT), neuromuscular conditions affecting the calf muscle pump, and congenital disorders. Prolonged functional valvular failure and reflux leads to chronic venous hypertension, which in turn triggers the chronic inflammatory changes and vessel wall injury associated CVD. CVD constitutes a spectrum of chronic morphologic and functional venous abnormalities manifested by clinical signs and/or symptoms and can be classified according to CEAP (Clinical, Etiological, Anatomical, and Pathophysiological) classification. Under the CEAP system, groupings (C0–C6) are based on clinical findings including the presence of telangiectasias or reticular veins, varicose veins, venous edema, skin pigmentation changes, or ulceration. Higher C-classification corresponds to more advanced CVD as shown in Table 1 [7–9]. The term CVD is used to summarize findings classified under the full range of CEAP groupings. Chronic venous insufficiency (CVI) refers to venous abnormalities classified as C3 through C6 [8].

The revised Venous Clinical Scoring System (VCSS) is another venous assessment tool utilized to categorize the overall severity of venous disease [10]. Unlike CEAP, VCSS scale is a dynamic tool that provides descriptions of the signs and symptoms of CVD and should be used to assess treatment outcome.

1.1. Epidemiology

Approximately 22–29% of the adult Western population carries a diagnosis of varicose veins and 5% have more advanced CVD findings such as skin changes or ulcerations [5,11–14]. In the United States, over 11 million males and 22 million females aged 40–80 years have varicose veins [15]. Over 2 million adults have advanced CVD and at least 20,556 individuals will have newly diagnosed venous ulcers each year [15,16].

Results from the Bonn Vein Study, a German population-based cross-sectional study of 3072 participants (43.9% male, 56.1% female) aged 18–79 years, revealed that nearly half of all men and over half of all women had signs or symptoms of CVD. These included varicose veins without edema or skin changes in 14.3% (12.4% men, 15.8% women), edema in 13.4% (11.6% men, 14.9% women), skin changes in 2.9% (3.1% men, 2.7% women), and healed or active ulceration in 0.6% or 0.1%, respectively [17,18]. In the United States, the American Venous Forum administered the multicenter National Venous Screening Program (NVSP), which screened 2234 adults (23% male, 77% female; 80% Caucasian) aged 17–93 years (mean 60 years) for venous disease. Findings from this program showed CEAP classifications from C0 to C6 to be 29%, 29%, 23%, 10%, 9%, 1.5%, and 0.5%, respectively (Fig. 1). Venous reflux was observed in 37% and obstruction in 5% of participants [19].

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Table 1
Summary of basic CEAP classification

Clinical classification
C0: no visible or palpable signs of venous disease
C1: telangiectasias or reticular veins
C2: varicose veins
C3: edema
C4a: pigmentation and eczema
C4b: lipodermatosclerosis and atrophie blanche
C5: healed venous ulcer
C6: active venous ulcer
S: symptoms including ache, pain, tightness, skin irritation, heaviness, muscle cramps, as well as other complaints attributable to venous dysfunction
A: asymptomatic
Etiologic classification
Ec: congenital
Ep: primary
Es: secondary (postthrombotic)
Anatomic classification
s: superficial veins
p: perforator veins
d: deep veins
Pathophysiologic classification
Pr: reflux
Po: obstruction
Pr,o: reflux and obstruction
Pn: no venous pathophysiology identifiable

There are an estimated 2,000,000 new cases of DVT each year in the United States [20]. DVT is an important manifestation of lower extremity venous disease because it can lead to potentially fatal pulmonary embolism (PE) or postthrombotic syndrome (PTS) [21]. Acute PE is the third most common cause of United States hospital deaths [22,23]. DVT, superficial thrombophlebitis, and PE are described collectively as venous thromboembolism (VTE). The sex- and age-adjusted incidence of first-time symptomatic VTE in the United States is between 71 and 117 cases per 100,000 individuals [24]. These account for over 600,000 hospital admissions each year [25–27].

PTS develops as a frequent chronic complication of DVT, occurring in 20–40% of patients within 1–2 years following symptomatic DVT, and a severe form of PTS is seen in 4–11% of patients [28–31]. Patients with PTS experience deteriorated disease-specific quality of life (QOL) when compared to those without the condition [28,32,33]. Additionally, the management and treatment of PTS contributes a significant portion to the overall economic burden of DVT sequelae [34].

1.2. Risk factors

Assessment of the severity of CVD is important for risk stratification, patient counseling, and potential therapy. Increased age, female gender, parity, family history of varicose veins, and standing occupation have all been shown to be risk factors for venous insufficiency/hypertension [1,35]. A variety of genetic, environmental, and hemodynamic factors likely influence the development and natural history of CVD, and research to determine associations with specific genes is ongoing [36,37]. Some studies have shown associations between obesity and postmenopausal status with CVD and CVI [11,38,39]. Overweight patients with varicose veins appear to be at higher risk for disease progression to CVI [40,41]. Occupational orthostatism, noncompliance with elastic stocking usage, and arterial hypertension may also serve as independent risk factors for progression of venous disease [42–45].

Risk factors for DVT are generally related to one or more components of Virchow's triad, and many thromboembolic risk factors are associated with a component of hypercoagulability on a genetic, acquired, or situational basis (Table 2). The most important risk factors for acute DVT include age, major surgery, trauma, hypercoagulable state, malignancy, hospital/nursing home care, individual or family history of VTE, immobilization, central venous catheters, pregnancy, estrogen replacement, oral contraceptives, hormonal treatment, and long-distance travel [46,47]. Several tools have been developed to evaluate risk for VTE, including the Caprini risk assessment model, which utilizes population data to calculate an individual's postoperative VTE risk score [48].

1.3. Vein screening

Currently, no universal screening guidelines for lower extremity venous disease exist. However, given the prevalence of CVD and incidence of VTE within the general population, venous screening programs may serve to identify individuals at risk for VTE, detect CVD, and potentially prevent consequences of CVD such as recurrent cellulitis or venous leg ulcers (VLUs).

The NVSP enrolled 476 individuals into a pilot study that aimed to educate, identify, and empower individuals with knowledge about common venous diseases affecting themselves and the community at large. The majority of participants (77%) were categorized as high or very high risk of developing VTE, if put in a high-risk situation. Additionally, 40% showed evidence of venous reflux, 6% showed signs of venous obstruction, and 20% had a clinical CEAP classification of CVI (≥C3). Analysis of the screening results demonstrated a correlation between risk stratification, duplex ultrasound (US) findings, and severity of CVD by clinical inspection [49]. In this study, increasing DVT risk scores demonstrated a

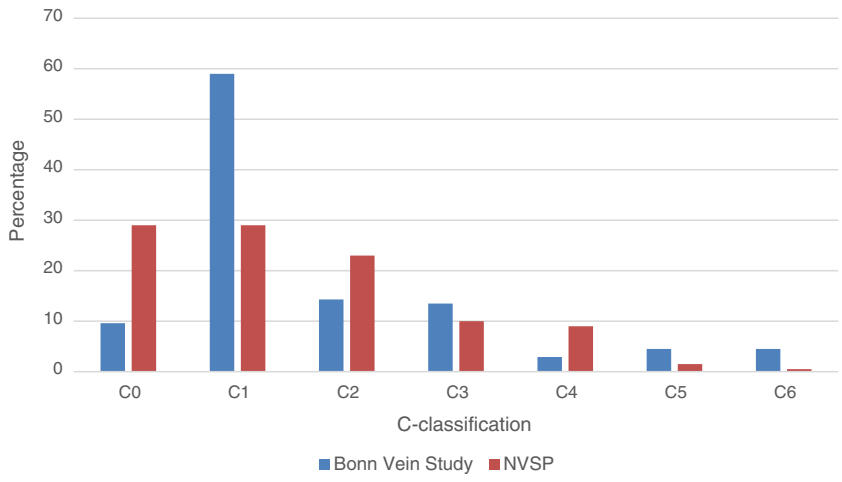

Fig. 1. Prevalence of C-classifications from the Bonn Vein Study and the NVSP [11,19].