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Investigating Femoral Vein Incompetence in the Etiology of Chronic Venous Disorders: An Ultrasonographic Study of Varicose Vein Patients

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Abstract

Background: Varicose veins are a common cause of chronic venous disorders (CVD). Despite a robust overview of valve prevalence, paucity exists in terms of precise positioning or distances of these valves, particularly concerning their relationship to the saphenofemoral junction, despite the presumption of primary and post-thrombotic VE disorders.

Objective: To investigate the etiology of femoral vein incompetence as a central element within the natural progression of CVD.

Methods: We conducted an investigation involving 80 patients with primary varicose veins, encompassing 87 limbs. Doppler ultrasonography (US) was performed on a total of 80 lower extremities of patients.

Results: Patients with higher CEAP clinical classes exhibited combined valvular incompetence, while those with ulcers had perforator incompetence. Hypertension was significantly associated with severity categories (p 0.001), with the highest prevalence in C4-C6. Heart failure, PAD, skeletal or joint leg diseases, and chronic obstructive pulmonary disease (COPD), which were more prevalent in severe CVD cases, were also identified.

Conclusions: These results could encourage a proactive approach in patients with CVD, and additional screening for diabetes mellitus, hypertension, heart failure, skeleton or joint disease, and emphysema may need to be performed in these patients.

Keywords: CVD, PAD, DM, HTN, HF, SFJ

Introduction

The elevated prevalence of chronic venous disorders (CVD) alongside the heterogeneous therapeutic options serves as the impetus for this anatomical investigation of femoral vein valves proximate to the saphenofemoral junction.[1] Despite venous valves not being the primary instigators of varicose veins, consensus underscores their incompetence as a central element within the natural

progression of primary and post-thrombotic venous disorders.[2-3]

The etiological underpinnings of varicose veins remain inadequately expounded despite their widespread prevalence across the age spectrum from adolescents to the elderly. Prevalence demonstrates geographic variation, with the Western world exhibiting the highest rates, spanning from 10% to 30% among males and 25% to 55% among females based on population-based inquiries. [5-7]

Notably, despite a robust overview of valve prevalence, paucity exists in terms of precise positioning or distances of these valves, particularly concerning their relationship to the saphenofemoral junction, despite the presumption of chronic venous disorders resulting from venous hypertension attributable to reflux.[4]

In summation, this study assumes the mantle of an exhaustive exploration into the intricacies of venous valves proximate to the saphenofemoral junction. A confluence of anatomical analysis and comprehensive elucidation of risk factors collectively contributes to our understanding of varicose vein etiology. Moreover, the technical advancements fueling refined diagnostic accuracy and therapeutic interventions provide a robust foundation for enhancing patient outcomes within the realm of venous disorders.

Material and Methods

This prospective cross-sectional study was conducted at the Department of Anatomy, S.M.S Medical College and attached Hospitals, Jaipur, following approval from the institutional ethical committee. Eighty patients diagnosed with primary varicose veins were enrolled after obtaining informed consent. Exclusion criteria included previous treatment for varicosities through operative procedures or sclerotherapy, as well as the presence of clinical or duplex findings indicative of superficial or deep venous thrombosis, or angiodysplastic disorders.

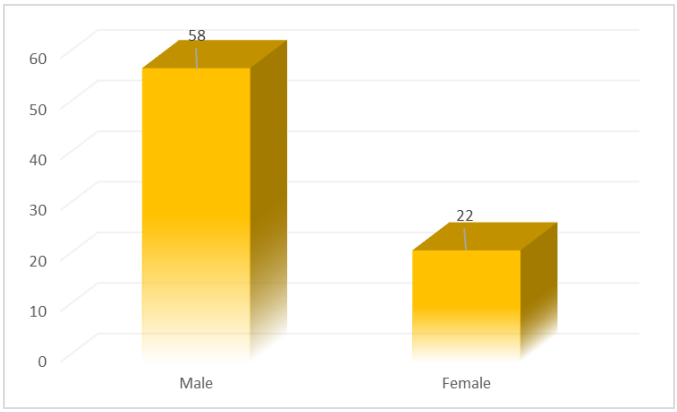
The clinical status of patients was assessed using the Clinical, Etiological, Anatomical, and Pathophysiological (CEAP) classification (8). Doppler ultrasonography (US) was conducted on a total of 80 lower extremities of the enrolled patients. Doppler US mappings of the lower limb venous systems were recorded. Vein morphology and valvular competence were evaluated in the standing position at the saphenofemoral junction (SFJ) and saphenopopliteal junction (SPJ), along the greater saphenous vein (GSV) and the small saphenous vein (SSV), their tributaries, and other epifascial veins. Vein patency was assessed in the supine position. The clinical severity of varicose disease was categorized according to the CEAP classification.

Sample size calculation: Sample size is calculated to be 70 varicose vein subjects for 80% power and 0.05 alpha error at 95% confidence level. Including 10% loss to follow-up, 80 varicose vein subjects were included in our study.

Observation and Result

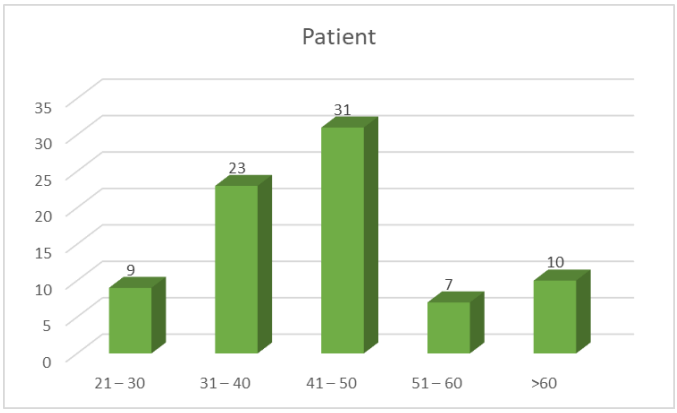
Following the acquisition of informed consent and institutional approval for the study, we enrolled 80 patients with primary varicose vein cases who met the specified inclusion and exclusion criteria. These cases were drawn from individuals attending the Outpatient Department (OPD) or admitted under the Department of CTVS & Radiology, S.M.S Medical College and attached Hospitals, Jaipur.

Figure 1: Gender distribution in study population



This figure presents the age distribution of 80 patients. The age groups are categorized as follows: 11.25% are between 21-30 years, 28.75% are in the 31-40 age range, 38.75% are in the 41-50 range, 8.75% fall in the 51-60 range, and 12.50% are above 60 years of age. The mean age is 44.06 years with a standard deviation of 10.35. This data is pertinent for academic research, providing insights into the age demographics within the patient cohort.

Figure 2: Age group distribution in study population



The figure provides demographic data on the occupation distribution of a sample of 80 patients. The majority of patients were engaged in occupations such as housewives (18.75%), coolies (21.87%), and farmers (25.0%). A smaller portion represents a range of professions, including bus conductors (3.14%), police trainees (3.14%), machine turners (3.12%), carpenters (6.25%), bakery suppliers (3.12%), hotel cooks (3.12%), hotel vendors (3.12%), school teachers (6.25%), and construction workers (5.0%).

Figure 3: Occupation in study population

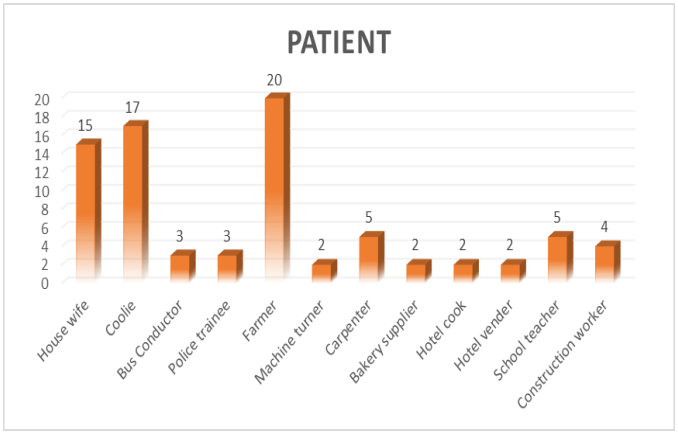
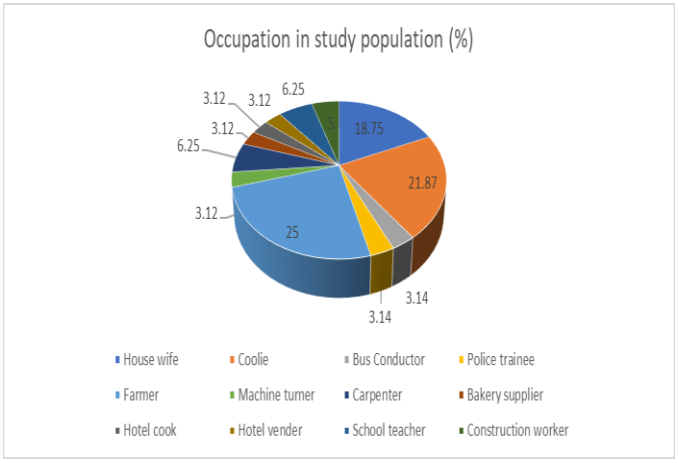
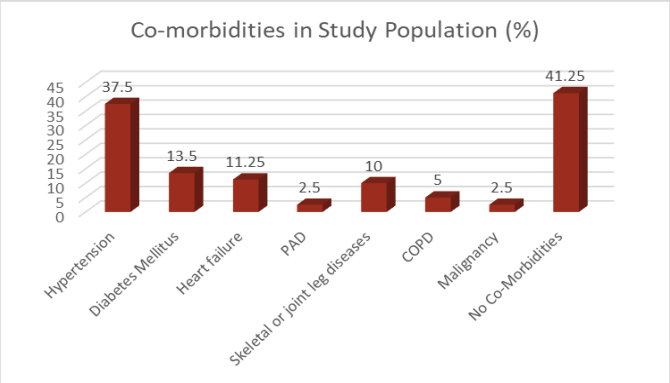


Figure 4: Occupation in study population



Above two figures provide information on co-morbidities in a sample of patients. Among the 80 patients, 37.5% had hypertension, 13.5% had diabetes mellitus, and 11.25% had heart failure. A smaller proportion of patients, 2.5%, exhibited peripheral artery disease (PAD) and malignancies. Additionally, 10% of patients had skeletal or joint leg diseases, 5% had chronic obstructive pulmonary disease (COPD), and 41.25% had no reported comorbidities. This data is relevant for academic research, offering insights into the prevalence of various co-morbid conditions within the patient cohort.

Figure 5: Co-morbidities in study population



Hypertension was significantly associated with severity categories ($p < 0.001$), with the highest prevalence in C4-C6.

Diabetes Mellitus also showed a significant association with severity categories ($p < 0.001$), mainly in C4-C6.

Heart failure, PAD, and skeletal or joint leg diseases were significantly associated with severity categories ($p < 0.01$), with higher prevalence in C4-C6.

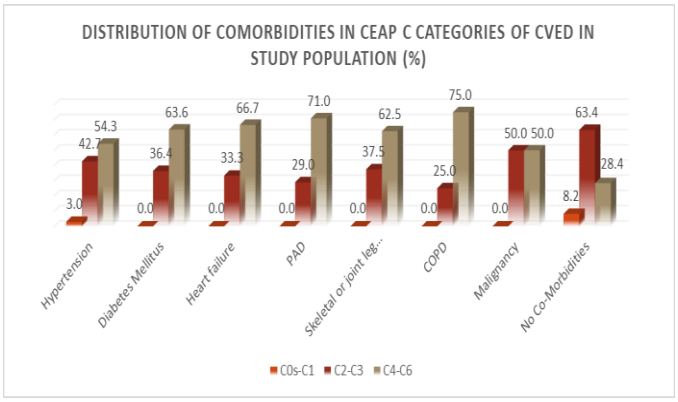
COPD was significantly associated with severity categories ($p < 0.001$), with the majority of cases in C4-C6.

Malignancy did not show a significant association with severity categories ($p = 0.996$).

Patients with no co-morbidities are significantly associated with severity categories ($p < 0.01$), particularly in C2-C3.

This data is valuable for academic research, providing insights into how different comorbidities relate to the severity of the condition, as indicated by the C0s-C1, C2-C3, and C4-C6 categories.

Figure 6: Distribution of Comorbidities in CEAP C Categories of CVeD in Study population



Discussion

In the current research, we conducted an investigation involving a cohort of 80 patients with varicose veins, encompassing 87 limbs. Among these patients, 58 were males, constituting a percentage of 72.5%. This male predominance stands in contrast to the findings in Western studies, exemplified by the work of Vaidyanathan et al and Callam MJ.

Our study further unveiled that the incidence of varicose veins and associated complications rises steadily with age, peaking in the 41-50 age group. The age range of patients in our study spanned from 21 to 70 years, with the majority falling within the 31-50 years age bracket, accounting for 67.5% of the cohort. This finding mirrors the results of the Edinburgh Vein Study.

In our study, most patients fell into CEAP class 2 and 3, which includes individuals with varicose veins only and those with limb edema, a trend similar to the Stuart WP series. Patients with higher CEAP clinical classes exhibited combined valvular incompetence, while those with ulcers had perforator incompetence. The majority of patients fell within the CEAP C2 to C3 category (68.57%), with fewer in the C4 to C6 categories (14.3%), and none in the C0s to C1 stages, consistent with findings from Zahariev et al.

Our study identified several comorbidities, such as Diabetes Mellitus, Hypertension, Heart Failure, Skeletal or joint leg diseases, and COPD, which were more prevalent in severe cases of Chronic Venous Disease (CVD). These comorbidities showed a significant association, adjusted for age, with CEAP C categories C4 to C6.

Studies by Lionis et al, Criqui et al, and others have also reported varying comorbidity patterns in CVD. Notably, we found that Hypertension was more prevalent in severe CVD cases, and COPD was a prominent comorbidity.

Conclusion

The varicose veins of lower limbs are a disease of younger age groups, occurring more commonly during the third and fourth decades of life. The occupations involving prolonged standing and violent muscular efforts are more prone for developing varicose veins. Duplex ultrasonography is the investigation of choice in the management of varicose veins. These results could encourage a proactive approach in patients with CVD. Additional screening for DM, HTN, HF, PAD, SJLDs, and emphysema may need to be performed in patients with severe CVD.

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