Venous Scenario in India

Ajay K. Khanna¹ · Sandeep Kumar²

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Abstract

Varicose veins, venous thrombosis, and other venous diseases are equally prevalent in India as anywhere else in the world. Scientific and epidemiological studies of venous diseases in India are being made but at a slow pace. It requires to be enhanced. To boost such efforts, the Vascular Society of India came into existence in 1995 but little progress has been made in advancing the speciality and care for venous diseases in India. Though Vascular Society of India also deals with the venous component but to be more specific and emphatic the Venous Association of India came into existence. In April 2007, seven surgeons met to create the organization's bylaws and registered the Venous Association of India in Chennai, Tamil Nadu, India, with the aim to promote the research and study of venous disease. These initiatives have recruited many surgeons looking into new vistas of sub or super specialization to join in the folds of Venous Association of India. These efforts have surely shown some results. As, several Indian authors have published books on venous diseases.

Keywords Vein · Epidemiology · Deep vein thrombosis · Chronic venous insufficiency

Introduction

Varicose veins, venous thrombosis, and other venous diseases are equally prevalent in India as anywhere else in the world. Scientific and epidemiological studies of venous diseases in India are being made but at a slow pace. It requires to be enhanced. To boost such efforts, the Vascular Society of India came into existence in 1995 but little progress has been made in advancing the speciality and care for venous diseases in India. The aim of the Vascular Society of India with its head office at Chennai are as follows: to encourage and advance the study and practice of the science and art of vascular surgery, to promote interaction among vascular surgeons and allied specialists in India and abroad, to encourage scientific research and experimental work on vascular disease, to organize scientific programs such as conferences and workshops, to be a resource for continuing medical education programs, audiovisual materials, etc. related to vascular surgery, to establish and

maintain reference libraries of books, magazines, newspapers, audiovisual materials, etc. related to vascular surgery, and to publish a journal devoted to vascular surgery and allied subjects. The Indian Journal of Vascular and Endovascular Surgery (IJVES) was founded in 2014 published quarterly as the official publication of the Vascular Society of India. This journal looks after the various vascular articles and also the work related to venous diseases. Though Vascular Society of India also deals with the venous component but to be more specific and emphatic, the Venous Association of India came into existence.

Venous Association of India (VAI)

In 2004, several surgeons began thinking about forming an association of care providers and other healthcare professionals who had a special interest in venous diseases in India. In line with American Venous Forum, the European Venous Forum, and other Phlebological Societies, a dedicated VAI was proposed. At that time, discussions about venous disease in India were primarily confined to a single session or two at the annual meetings of the Vascular Society of India. The first program that focused on venous disease in India was the Continuing Surgical Education Program in Vascular Surgery and Venous Diseases that was held at Christian

✉ Ajay K. Khanna
akhannabhu@gmail.com

¹ Department of General Surgery Institute of Medical Sciences, Banaras Hindu University, 221005 Varanasi, India

² Department of General Surgery, King Georges Medical University, Lucknow, India

Medical College in Vellore, India, in 2005. In April 2007, seven surgeons met to create the organization's bylaws and registered the Venous Association of India in Chennai, Tamil Nadu, India, with the following aims: to promote the research and study of venous disease, to help facilitate the active continuing education of its members, to improve understanding about the prevention, investigation, and treatment of venous disease, to encourage the development and dissemination of information about venous disease, to promote collaboration between venous, phlebological, and vascular societies, health agencies, and health experts at national and international levels, to award scholarships and stipends for research and training in the field of venous disease, and to cooperate with any other organization whose objectives are similar to those of the VAI. The first Executive Committee was initially comprised of seven members. This association holds its annual meeting every year usually in the month of February and March and this is a 3-day-program where only venous problems are discussed. The first conference was held at Chennai. Approximately, 20–30 overseas visitors from all over the world attend this meeting. This year in 2021, it was held virtually because of COVID pandemic. These initiatives have recruited many surgeons looking into new vistas of sub or super specialization to join in the folds of Venous Association of India. These efforts have surely shown some results. As, several Indian authors have published books on venous diseases [1–6].

Varicose Veins

The importance of identifying and treating the venous disease is getting better with increasing use of ultrasound and color Doppler duplex assessment, endovenous therapies, adequate anticoagulation, compression therapies, thrombo-prophylactic measures, and venous ulcer care. These worldwide developments in the advanced countries are now also being adopted and adapted in Asian countries and India. However, more epidemiological studies are needed to assess the incidence and natural course of the venous disease in different populations and effect of various treatments on the natural course of venous diseases. Even the study of anatomical aspects of the venous system is necessary to be studied in more details [7]. Proper treatment and research for venous diseases has been a long unmet need in India and many other countries. It is relatively an easier, less expensive, and not requiring major infrastructure sub-specialty which can be taken up by general surgeons practicing in smaller districts and rural areas also.

Varicose veins are part of the spectrum of chronic venous disease and include spider telangiectasias, reticular veins, and true varicosities. Approximately, 23% of US adults have varicose veins. If spider telangiectasias and reticular veins are also considered, the prevalence increases to 80% men and

85% women. Generally, more common in women and older adults, varicose veins affect 22 million women and 11 million men between the ages of 40 and 80 years. Two million men and women will develop symptoms and signs of chronic venous insufficiency, including venous ulceration [8, 9].

An epidemiological survey carried out way back in 1972 on Indian railroad workers determined the prevalence of varicose veins to be 25% in southern and 6.8% in northern India [10].

A study from Mangalore, 170 varicose vein cases admitted in tertiary care hospitals between May 2011 and April 2014. Majority of cases 53 (31.2%) were of the age group 41 to 50 years. Majority were males 127 (74.7%) and majority were unskilled workers 101 (59.4%). Superficial veins were involved in 123 (72.4%) cases. Perforator followed by great saphenous vein was most frequently involved. Veins on the left side were more involved than on the right. Common symptoms at the time of presentation was ulceration 98 (57.6%) followed by pain in the legs 96 (56.5%). Ulceration was seen significantly more among women ($p < 0.027$) and house wives ($p < 0.004$). Complications like eczema 46 (27.1%), non-healing ulcers 21 (12.3%), and deep vein thrombosis 10 (5.9%) were reported in these cases. Eczema was present significantly more among elderly patients aged above 60 years ($p < 0.019$). Risk factors like prolonged standing was observed in 86 (50.6%) cases. This history was significantly seen among men ($p < 0.001$) and those involved in unskilled occupations ($p < 0.001$). Recurrence of varicose vein was reported in 23 (13.5%) cases. It was associated with younger age group 21 to 30 years ($p < 0.021$). Doppler ultrasound was the most common 120 (70.6%) investigation done. Micronized purified flavonoid fraction was used in management in 15 (8.8%) cases. Medical management methods like limb elevation 50 (29.4%) and compression stocking 36 (21.2%) was advised to patients. Saphenous vein stripping was the most common surgical procedure 40 (23.5%) performed. The high risk groups identified in this study need to be made aware of risk of developing varicose veins. Use of compression stocking at work place added with newer procedure in management could help in betterment in their quality of life [11].

In the western scenario, it has been found that incidence of varicose veins is higher in women [12]. But on the contrast in India, it is seen more in men. A study from D Y Patil Hospital, Pune, found 70% of patients were men, and only 30% were women [13]. Similar findings were from Rohtak where Vashist et al. showed 64% males and 36% women [14].

Although several reasons have been hypothesized for the varicose veins but bacterial infective pathology for varicose veins was not thought off up until a study done at Banaras Hindu University on 42 truncal veins and 113 non truncal veins. In 42 truncal veins, 9 specimens were sterile and 17 (40.4%) specimens showed growth of *Micrococci* sp.; 6

(14.3%) *Pseudomonas* sp.; 4 (9.5%) *Klebsiella* sp.; and 2 (4.7%) *Proteus* sp. In 113 non truncal veins, 31 specimens were sterile while 31 (27.43%) showed *Micrococci* spp., 14 (12.4%) *Pseudomonas* spp., 12 (10.6%) *Staphylococcus aureus*, 6 (5.31%) *Klebsiella* spp. To confirm the findings of culture, DNA PCR was done with specific for named bacteria. In 42 truncal veins, 10 (23.8%) *Pseudomonas*, 6 (14.3%) *Staphylococcus*, 5 (11.9%) *Klebsiella*, 2 (4.8%) *Proteus*, and 1 (2.4%) *Citrobacter* were detected. In non-truncal veins in 113 specimens, 25 (22.1%) *Pseudomonas*, 19 (16.8%) *Staphylococcus*, 7 (6.2%) *Klebsiella*, 2 (1.8%) *Proteus*, and 1 (0.9%) *Citrobacter* were detected. Although bacterial etiology of varicose veins has not been studied well enough till date, in consideration of the results of above study, bacterial etiology of varicose veins is highly probable [15]. The same group also looked into the various inflammatory markers. Blood withdrawn from the site of varicose vein appears to have significantly increased concentration of interleukin-6, fibrinogen, and hemoglobin when compared to same patient's antecubital venous blood sample supporting the hypothesis of greater inflammation in tissues drained by varicose veins [16].

In India, still many centers offer open surgical treatment but in the metro cities and big cities, many centers are carrying out minimal invasive techniques for ablation of varicose veins as endovenous ablation by sclerotherapy and laser, endovenous radiofrequency ablation [17]. Few centers have started the endovenous steam sclerosis and microwave ablation. As these techniques require tumescent anesthesia so newer techniques as glue injection and mechanochemical ablation (MOCA) have also been used.

Chronic Venous Insufficiency (CVD)

CVD is one of the most common vascular disorders observed across the world and can severely impact life style (QOL), reduce patients' working hours, and impose a socioeconomic burden. Nonetheless, despite the capability of CVD to cause grave consequences, it remains one of the prominently underestimated and neglected diseases. Knowing CVD's potent disruptive nature, it is paramount to give it serious consideration and to define proper measures to prevent and/or manage it.

High prevalence, cost of investigation and treatment, and loss of working days due to CVD have a significant socioeconomic impact, and the problem is compounded because chronic venous insufficiency (CVI) is progressive and has a propensity to recur. The economic burden of CVD treatment is attributed to direct costs, such as medical and nursing costs and costs of investigation and treatment, and indirect costs, such as those related to loss of working days. Several studies carried out in different countries have shown that CVD incurs a significant economic burden. However, studies evaluating

the incidence of CVD in India are limited. An epidemiological survey carried out way back in 1972 on Indian railroad workers determined the prevalence of varicose veins to be 25% in southern and 6.8% in northern India [10].

As the CVD is quite prevalent so there should be definite criteria which can define the role of intervention. The type of afflicted veins and the size of the veins can define that which patients may require intervention. Demographic characteristics and risk factors were recorded from 6350 patients. Patients with reflux in smaller veins (vein size < 4 mm diameter) were considered as type I and those with varicosities in truncal veins (> 4 mm diameter) as type II. Risk ratio was determined by multivariate regression analysis. About 47.67% of patients in this study were found to have CEAP class 3 disease. Compared with varicose veins of large truncal veins, patients with varicosities in smaller superficial veins had 2.85-fold ($p < 0.01$) more risk of edema and 5.71-fold ($p < 0.01$) higher prevalence of hyperpigmentation. Varicosities in small superficial veins were associated with higher risk of ulceration (odds ratio 3.93, 95% confidence interval 2.51–6.18) compared with truncal vein reflux. Their study revealed that presence of small varicose veins in patients without truncal saphenous reflux involvement is associated with severe manifestations of venous insufficiency such as edema and skin lesions even in the absence of varicosities in truncal saphenous veins [18].

Chronic venous insufficiency causes skin pigmentation of the leg ranging from small patches of mild dyschromia to extensive areas of severe skin pigmentation. It is thought that the pigmentation is mainly due to hemosiderin or melanin deposition. A study on 45 patients at Banaras Hindu University categorized the grading of pigmentation into four grades: +, few spots; ++, pigmentation over gaiter area; +++, pigmentation involving leg and ankle; +++++, heavily pigmented (dark). Majority of cases, i.e., 62% of limbs fall under (++) grade of pigmentation, followed by (+) grade of pigmentation in 20%, while (+++) and (+++++) constitute 9% of the cases each. Increased melanin deposition was seen in 40 pigmented skin biopsies and 3 normal skin biopsies from the case group, and normal melanin deposition was seen in all the non-varicose controls [19, 20]. Ambulatory venous pressure measurement study carried out at Banaras Hindu University correlates with the clinical grading of the CEAP classification of varicose veins. Ambulatory venous pressure measurements do not help in determining the anatomical sites of incompetence. Pressure relief index, the recovery time intervals, and the mean ambulatory venous pressure are the important parameters that can help in identifying and grading the severity of the disease [21].

In a prospective observation study on Indian patients, QOL was approximately 50% at baseline and improved

significantly ($P < 0.001$) after treatment with micronized purified flavonoid fraction (MPFF) [22]. A consensus statement for the management of CVD has been developed and it mainly tell the role of primary doctors in diagnosing this condition along with education to the society [23].

Leg Ulcer

Compression therapy is the mainstay treatment for venous ulcer [24]. However, in failure cases, surgery can be preferred. Medical management with MPFF as an adjuvant therapy to standard treatment has been reported to be effective and safe in patients with venous ulcer. In addition to standard therapy, diet and lifestyle modification including progressive resistance exercise, patient education, leg elevation, weight reduction, maintaining a healthy cardiac status and strong psychosocial support reduces the risk of recurrence and improves the quality of life in patients with venous ulcer. A consensus was made as an evidence-based management approach for the patients with venous ulcers. Various management options for venous ulcers include compression therapy, minimally invasive procedures like sclerotherapy and ablation techniques, surgical procedures, debridement, and medical management with micronized purified flavonoid fraction (MPFF) [25, 26].

In India, many indigenous and traditional home remedies are commonly used including honey, neem oil, and aloe vera. However, there are no evidence based studies to advocate their use in leg ulcers. Honey-impregnated dressings did not significantly improve venous ulcer healing at 12 weeks compared with usual care in a large community-based open-label randomized trial (level B) [27]. Activated charcoal has been tried in malodorous leg ulcers [28]. Boiled potato peel (PP) dressing has been used in chronic leg ulcers (level D) [29]. The PP dressing acts as a barrier, thereby protecting the wound against exogenous agents and secondly the cork layer of the PP prevents dehydration, thereby providing a moist environment which is the single most important factor for wound healing. Honey-impregnated dressings have been used for its antiseptic/antibacterial effects and have shown a favorable outcome in wound healing in burn patients, in comparison to boiled PPs and silver sulfadiazine (level C) [30–32].

Deep Vein Thrombosis

The prevailing notion that the incidence of VTE in Asians is less than that in the Western population has been disproved by several studies. The incidence of postoperative DVT in Indian patients undergoing major lower limb surgery is as high (43% and 60% patients in the groups with and without prophylaxis, respectively) as seen in the Western world [33–35].

A study was conducted at Pune, Ludhiana, and Bangalore, to provide real-world information on patient characteristics, management strategies, clinical outcomes, and temporal trends

in VTE. A multicenter retrospective registry involving 549 medical records of patients with confirmed diagnosis of VTE (deep vein thrombosis [DVT] confirmed by Doppler ultrasonography; pulmonary embolism [PE] by computed tomography, pulmonary angiography and/or V/Q scan) from 2006 to 2010 at three Indian tertiary care hospitals Pune, Ludhiana, and Bangalore. Acute DVT without PE, acute DVT with PE, and PE alone were reported in 64% (352/549), 23% (124/549), and 13% (73/549) patients, respectively. Mean age was 47 (± 16) years, and 70% were males. H/o DVT (34%), surgery including orthopedic surgery (28%), trauma (16%), and immobilization > 3 days (14%) were the most common risk factors for VTE. Hypertension (25%), diabetes (19%), and neurological disease (other than stroke) (8%) were the most common co-morbidities. Most (94%) were treated with heparin alone (82%) or fondaparinux (2%) for initial anticoagulation; low molecular weight heparin alone (5%) or warfarin/acenocoumarol (76%) for long-term anticoagulation. Anticoagulant treatment was stopped because of bleeding in 2% (9/515) patients. Mortality was 7% among patients diagnosed with VTE during hospital stay versus 1% in those hospitalized with diagnosed VTE. The annual incidence of DVT ($\pm$ PE) increased from 2006 to 2010. The study concluded that acute DVT alone was responsible for the substantial burden of VTE in Indian patients. Bleeding was not the limiting factor for anticoagulant treatment in most patients [36].

Several risk factors for deep venous thrombosis (DVT) have been identified, and inherited thrombophilias constitute a significant proportion of them. The most common inherited thrombophilia is activated protein C (APC) resistance, and factor V Leiden is the most common cause of APC resistance. The high prevalence of APC resistance in Caucasians is established, and the prevalence among persons of Asian and African descent has been shown to be low in previous studies. A study conducted at Banaras Hindu University, twenty-three patients with lower limb DVT were included in the study. Diagnosis was confirmed by duplex ultrasonography. Patients were tested for APC resistance with use of the STA Staclot APC-R system (Diagnostica Stago, Asnieres, France). Ten patients (43.5%) tested positive for APC resistance, while 13 (56.5%) tested negative. APC resistance, although considered a rarity, has been found to have a high prevalence in patients with DVT from the northeastern region of India. APC resistance estimation should be done for all patients with DVT [37].

Pulmonary embolism is one of the commonest cause of sudden unexplained deaths in hospitalized patients [38]. In subset data of ENDORSE, it was found out despite a similar proportion of at-risk hospitalized patients in India and other participating countries, there was major underutilization of prophylaxis in India. It necessitates increasing awareness about VTE risk and ensuring appropriate thromboprophylaxis [39].

Post-thrombotic syndrome (PTS) is a late outcome of deep vein thrombosis characterized by cramping pain, swelling, hyperpigmentation, eczema, lipodermato-sclerosis, and ulceration in the leg due to increased venous outflow resistance and reflux venous flow. Newer surgical and endovascular interventions have a promising result in the management of post-thrombotic syndrome. Early surgical or endovascular interventions in appropriately selected patients may decrease the incidence of recurrent ulceration and skin changes and provide a better quality of life. Duplex and IVUS (intravenous ultrasound) along with venography serve as cornerstone investigative tools for assessment of reflux and obstruction. Venous obstruction, if present, should be addressed earlier than reflux. It requires endovenous stenting, endophlebectomy, or open bypass procedures. Venous stripping, foam sclerotherapy, radiofrequency, or laser ablation are used to abolish superficial venous reflux. Valvuloplasty procedures are useful for incompetent but intact deep venous valves, while transposition or axillary vein autotransplantation is done for completely destroyed valves [40].

Conclusion

Venous disease as thought that it is not so common in Indian scenario is not a true statement. More and more studies are needed to look into the epidemiology of various problem especially the chronic venous deficiency and deep venous thrombosis.

Declarations

Competing interests The authors declare no competing interests.

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