DOI: 10.7860/JCDR/2024/68661.19476

Review Article

Complementary/Alternative Medicine Section

A Brief Review of Varicose Veins in the Upper Limb from an Ayurvedic Perspective

SHUBHAM BOBADE[1], SHEETAL ASUTKAR[2], AMAR KADAV[3]

ABSTRACT

Varicose veins typically occur in the lower limbs, caused by valvular insufficiency leading to the swelling and tortuosity of subcutaneous veins. Although rare in the upper limbs, they can be successfully diagnosed and treated. Rare causes include congenital vascular anomalies like Klippel-Trenaunay syndrome and Parkes Weber syndrome, characterised by Arteriovenous (AV) fistulae. Subclavian vein thrombosis-induced venous outflow obstruction is another uncommon cause. Diagnosis involves a thorough history taking with clinical examination, often supplemented by investigations. Invasive procedures are rarely necessary but may be used in unique cases to define the pathology further. Treatment for upper limb varicose veins closely mirrors lower limb approaches. The stab-avulsion technique combined with stripping of lengthier sections yields outstanding cosmetic and functional results. Surgical ligation with stripping effectively eliminates varicosities with a low risk of recurrence. Sclerosing agents like Sodium Tetradecyl Sulphate and Polidocanol are substitutes for surgery. In cases of varicosities resulting from upper limb arteriovenous fistulae, surgical intervention involving ligation of the distal venous limb or division of the fistula is the standard approach. In summary, while upper limb varicose veins are exceptionally rare, they can be accurately diagnosed and effectively treated with surgical interventions similar to lower limb varicose veins.

Keywords: Circulation, Sclerotherapy, Surgery, Varices, Varix

INTRODUCTION

Varicose veins develop as a consequence of valvular insufficiency within the deep, superficial, and perforating venous systems. This valvular inadequacy results in the backflow of blood, leading to elevated venous pressure and subsequent distension, elongation, and tortuosity of the subcutaneous veins in the lower limbs [1]. The legs represent the most commonly affected area by varicose veins, characterised by the accumulation of blood in the superficial leg veins [2]. This venous condition often results in the swelling and elevation of these veins, causing them to become visible through the skin with a purple or blue hue. Spider veins, a milder form of varicose veins, share a similar vascular pattern [3]. Haemorrhoids refer to varicosity located in the vicinity of the anus, while varicocele pertains to their presence in the scrotal region [4]. Varicose veins occurring in the upper limb are exceptionally uncommon, making this clinical presentation an unusual occurrence in this anatomical region [5]. Varicose veins are a prevalent condition, affecting 40% of males and 32% of females in the age group of 18 to 64 years [6]. No data are available about the prevalence or incidence rate of varicose veins of the upper limb. Given the myriad of physical, social, and psychological ramifications associated with varicose veins, these conditions can exert a substantial adverse impact on an individual's overall quality of life [7]. The presence of severe varicose veins may indicate the presence of chronic venous insufficiency, which impairs the ability of veins to effectively pump blood back to the heart. Individuals with varicose veins might face an increased risk of developing blood clots. These varicose veins are commonly recognised as a characteristic clinical manifestation of chronic venous disease [8]. Varicose veins can be associated with a condition in Ayurveda known as "*Siraj Granthi*" (the occurrence of nodular growth in the body channels) [9]. In this condition, the blood vessels in the affected area become swollen, fibrous, and twisted. The veins responsible for carrying blood lose some of their elasticity [10]. Prolonged periods of standing, carrying heavy loads, exhaustion, and extended walks put a strain on the veins in the lower leg; the same pathology may be applicable, particularly in the arm and forearm [11]. Consequently, veins in this part, like the cephalic vein, become fatigued and have difficulty pushing blood upwards. Over time, this results in the veins swelling, expanding, and losing their ability to contract and return to their original state, leading to the development of varicose veins in the upper limbs [12]. In the context of "*Siraj Granthi*," two primary imbalanced factors in Ayurveda are "*Vata*" (*dosha* responsible for movement and cognition) and "*Rakta*" (blood tissue). According to Ayurvedic principles, this condition is considered "*Krichhsadhya vyadhi*" (difficult to cure), meaning it is curable with difficulty in its early stages but becomes "*Asadhya*" (non curable) in the later stages [13]. The manifestation of "*Siraj Granthi*" involves the dilation of veins, known as "*Siraakunchana*" (vasoconstriction), and a distortion in the vein structure, referred to as "*Vakreekarana*" (tortuosity). These effects are the result of an accumulation of "*Rakta*" and an aggravation of "*Vata*" in the "*Siras*" (blood vessels), leading to localised congestion. Consequently, this congestion gives rise to symptoms such as "*Shoola*" (pain) and "*Shotha*" (swelling) in the affected area. Acharya Sushruta, often regarded as the Indian father of surgery, possessed a comprehensive repertoire of both surgical and parasurgical techniques, which gave rise to what is known as a four-fold approach for managing various medical conditions. These four procedures are referred to as "*Shastrakarma*" (surgical intervention), "*Ksharakarma*" (use of alkali), "*Agnikarma*" (thermal cauterisation), and "*Raktamokshana*" (bloodletting). This four-fold approach is notably effective in the successful treatment of varicose veins [14]. In contemporary medicine, treatment choices for varicose veins are compression stockings, endovenous laser, sclerosing injection, radiofrequency ablation, and procedures like stripping and avulsion phlebectomy. Additionally, lifestyle modifications, which involve receiving advice, refraining from tight clothing, dietary adjustments, elevating the legs, and engaging in exercise, also play a crucial role in managing this condition [15]. The principles of Ayurveda have proven insightful in elucidating the presentation of this uncommon varicose vein

condition in the upper limbs. Lower limb varicose veins have been extensively covered in existing literature [16]. The present review aimed to explore the uncommon occurrence of varicose veins in the upper limbs, investigate the causes and management of varicose veins in the upper limb, and shed light on the Ayurvedic and modern perspectives.

LITERATURE SEARCH

The search terms "varicose veins of the upper limb," "varicose veins of the upper extremity," "varicose veins," and "*Siraj Granthi*" were employed in searches conducted within the online databases PubMed and Google Scholar. The investigation encompassed a comprehensive review of experimental research, case studies, and case series, focusing on discussions related to the causes and management of varicose veins in the upper limb. The present review excluded studies with unavailable abstracts or those presented in languages other than English, ensuring the inclusion of relevant and accessible scholarly works. Data acquisition was accomplished through the review of classical Ayurvedic texts.

DISCUSSION

Causes of Varicose Veins

Several causes can be attributed to the occurrence of varicose veins. These include:

1) **Prolonged standing:** Varicose veins can develop as a result of spending extended periods standing, which increases blood volume and pressure in the upper limb due to the gravitational consequence. Both excess weight and extended periods of standing, often associated with certain occupations, are linked to the formation of varicose veins [17].
2) **Pregnancy:** During pregnancy, the body experiences an increase in blood volume, leading to heightened venous pressure. The rise in blood volume during pregnancy, mainly due to increased plasma activity, may further exacerbate this condition [18].
3) **Age:** As individuals age, vein valves undergo wear and tear, and the elasticity of vein walls diminishes. These age-related changes contribute to the weakening of the valve system. Reports have shown that a substantial population of adults between the ages of 18 to 64 years may develop varicose veins in the upper limb [19].
4) **Obesity:** Excess weight places added strain on veins, impeding their ability to return blood to the heart. This increased pressure can lead to valve dysfunction and leakage. Obese individuals, in particular, seem to be more susceptible to the development of varicose veins in the upper limb due to their body weight [20].
5) **Genetics:** Varicose veins can run in families, indicating a genetic predisposition for weakened venous walls. This hereditary aspect plays a fundamental role in the development of the condition [21].
6) **Tobacco smoking:** Smoking is associated with an increased risk of varicose veins due to its contributions to oxidative stress [22], hypoxia [23], and endothelial damage [24]. Hypoxia, caused by smoking, leads to localised inflammation, increasing vascular permeability and causing oedema. This process involves various physiological factors contributing to venous insufficiency in the upper limbs [25].
7) **Physical trauma:** Trauma to the underlying blood vessels can damage the veins and lead to the development of varicose veins in the upper limb [26].
8) **Prolonged activity:** Extended periods of lifting heavy weights can increase the workload on veins, potentially weakening vein walls and valves. When vein walls lose their elasticity and valves malfunction, blood can flow backward, leading to vein swelling and enlargement. The exact cause of varicose veins is not always clear and can result from a combination of these factors, or it may be idiopathic in many patients [27].

Nidana (causes) of *Siraj Granthi*

According to Ayurveda, the causes of "*Siraj Granthi*" include excessive physical exertion beyond one's capacity, especially in individuals who are physically weak (*Shramatiyogat*), prolonged walking, particularly in individuals with reduced physical strength (*Adhwagamana*), immersing one's forearms or legs in water, particularly cold water, engaging in strenuous physical exercise, and involvement in weightlifting activities (*Bharavahana*) [27].

Samprapti (Pathophysiology) of *Siraj Granthi*

"*Siraj Granthi*" can be attributed to an imbalance in the "*Vata*" within the body. When "*Vata*" becomes aggravated, it may localise in specific areas, such as the upper limb in this case, leading to symptoms like swelling and pain. If not properly managed, this can result in a serious health issue, such as varicose veins of the upper limb. Treating "*Vata*" is crucial in preventing varicose veins [28].

MANAGEMENT OF VARICOSE VEINS OF THE UPPERLIMB

Conservative Management

Conservative treatment for managing varicose veins in the upper limb involves various approaches such as compression, elevation, lifestyle modification, and weight loss. Compression, using items like bandages and support stockings, is employed to enhance blood circulation and alleviate symptoms associated with varicose veins. Elevation of the affected hand is another approach that helps reduce pressure on the veins and promotes improved blood flow. Lifestyle modifications, including regular exercise and avoiding prolonged periods of standing, are recommended to effectively manage varicose veins in the upper limb. Additionally, weight loss is considered a beneficial measure, as shedding excess weight can alleviate strain on the veins, potentially leading to a reduction in varicose vein symptoms [29].

Endovenous and Interventional Management

Endovenous and interventional treatments offer various methods for the management of varicose veins, including sclerotherapy, foam sclerotherapy, Endovascular Laser Ablation (EVLA), surgical ligation and stripping, and ambulatory phlebectomy. Sclerotherapy, a minimally invasive outpatient procedure, targets small and medium-sized varicose veins by injecting a sclerosing solution, prompting the veins to scar and close, ultimately disintegrating them [30]. Foam sclerotherapy, performed under ultrasound guidance, involves injecting a foam solution and is a preferred method for open, visible varicose veins, although it carries a rare risk of severe complications such as soft-tissue necrosis [31]. EVLA utilises a heated catheter inserted into enlarged veins, causing them to collapse and seal closed upon removal-A technique particularly chosen for larger varicose veins [32]. Surgical ligation and stripping involve tying off and removing a vein through small incisions without affecting circulation [33]. Ambulatory phlebectomy utilises hooks to remove varicose veins through tiny skin incisions, representing another effective approach in managing this condition [34].

Ayurvedic Management

Modalities of Ayurvedic management of varicose veins include the following:

1) ***Basti karma* (medicated enema):** It proves to be highly effective in the treatment of "*Vata vyadhi*", particularly in cases of "*Siraj Granthi*". According to Acharya Charaka, "*Vata*" plays a paramount role in the development of diseases, and there is no treatment more potent than "*Basti*". In "*Siraj Granthi*", an ailment characterised by an aberration in the "*Sira*" channels, "*Basti*" stands out as the primary therapeutic approach. This treatment holds the distinction of being the ultimate remedy, capable of curing various conditions while thoroughly cleansing the interior of the channels [35].

2) ***Siravyadhana* (Venepuncture):** It is a type of *Raktamokshana* (bloodletting). It is said to be '*chikitsardha*', meaning half of the treatment described in *Shalyatantra* (the surgery branch of Ayurveda); similarly, *Basti karma* is also known in *Kayachikitsa* (the medicine branch of Ayurveda). *Raktamokshan* is the process of removing morbid *Rakta* from the body. Acharya Sushruta considered *Rakta* as the fourth *Dosha* of the body; hence, it plays an important role in the manifestation of diseases. It is considered a primary or adjunctive treatment for varicose veins and aims to address imbalances in "*Vata*" and "*Rakta Dhatu*" which contribute to this condition. The procedure involves the middle part of the affected vein being marked and punctured using a *Kutharika* (scalpel) instrument; nowadays, scalp vein sets or intravenous catheters are used to remove blood [36].

3) ***Jalaukaavacharan* (Leech therapy):** It is also a type of *Raktamokshan* and is useful in cases of "*Rakta Vikara*" (diseases caused due to infected blood) to remove infected blood from a specific area. It is considered less invasive than *Siravyadhana* and involves the application of leeches to the affected region, utilising their bioactive compounds to aid in the treatment. Leech treatment has anti-inflammatory and analgesic effects, making it a valuable treatment option for varicose veins [37].

4) **Ayurvedic medicines:** Notable formulations include *Kaishor Guggulu*, *Mahamanjisthadi Quath*, *Sahacharadi Quath*, and Capsule *Ksheerbala Aavarti* for the management of "*Siraj Granthi*" [38] [Table/Fig-1].

S. No.	Therapeutic approach	Description
1.	*Basti Karma* (Medicated enema)	Balances vitiated *Vata Dosha*
2.	*Siravyadhana* (Venepuncture)	Balances vitiated *Vata* and *Rakta Dhosha*
3.	*Jalaukaavacharan* (Leech therapy)	Balances vitiated *Vata* and *Rakta Dhosha*
4.	Ayurvedic medicines	*Kaishor Guggulu*, *Mahamanjisthadi Quath*, *Sahacharadi Quath*, Capsule *Ksheerbala Aavarti*

[Table/Fig-1]: Ayurvedic management for *Siraj Granthi*.

Preventing and addressing "*Siraj Granthi*" early is crucial for reducing complications and enhancing the quality of life. While varicose veins in the upper limbs are rare, they can be diagnosed and treated successfully, similar to lower limb varicose veins. Although the exact cause is not definitively established, it is likely similar to lower limb varicose veins, potentially related to collagen defects in the vein walls that result in weakness and dilation [39]. In addition to collagen defects, primary valvular incompetence with floppy valve cusps is a recognised cause of deep venous reflux, which can extend to the superficial system, resulting in venous dilatation. Interestingly, varicose veins are notably less common in the thin-walled veins of the arms compared to the lower limbs, likely due to the increased hydrostatic pressure in the lower limbs when standing [40]. There are also rare causes of upper limb varicose veins, including congenital vascular anomalies like Klippel-Trenaunay syndrome [41] and Parkes Weber syndrome [42], as well as congenital arteriovenous fistulae [43], typically seen in haemodialysis patients. Venous outflow obstruction due to subclavian vein thrombosis [44] can be another uncommon cause. The diagnosis of upper limb varicose veins involves a thorough history and physical examination, complemented by non invasive duplex investigations. Treatment of upper limb varicosities mirrors the approach used for lower limb varicose veins. The stab-avulsion technique [45] combined with stripping of longer segments yields excellent cosmetic and functional outcomes. Surgical ligation and stripping [46] successfully eliminate the varicosities, with a low risk of recurrence during follow-up. In some cases, sclerotherapy [47] with agents like Sodium Tetradecyl Sulphate and Polidocanol serve as a viable alternative to surgery.

When addressing varicosities resulting from upper limb AV fistulae, surgical intervention is the standard approach, typically involving ligation of the distal venous limb or division of the fistula itself [48]. Leech therapy is proven to be beneficial in providing pain relief and reducing redness, swelling, local warmth, and tenderness in the upper limb joints. These improvements collectively contribute to enhancing joint mobility and, consequently, have a positive effect on the patient's overall quality of life [49]. *Siravyadhana*, a type of blood purification therapy, is beneficial for its effectiveness in treating varicose veins in the upper limbs. By removing the vitiated "*Vata*" and "*Pitta*" *doshas* directly from the affected site, the therapy alleviates symptoms such as pain, dryness, and inflammation, addressing the root cause of the disease [50]. Previous case studies describe patients presenting with varicose veins who were successfully managed using Ayurveda. The patients experienced significant relief in pain, burning sensation, swelling, and skin discolouration, notably after internal oleation, *Snigdha Virechana* (purgation), and bloodletting, with the follow-up showing partial recovery in venous colour Doppler reports, emphasising the effectiveness of Ayurvedic conservative management for varicose veins [38,51].

CONCLUSION(S)

The diagnosis of upper limb varicose veins involves a thorough assessment to confirm the condition's presence and severity. Once diagnosed, a treatment plan can be employed to meet the individual's specific needs. Surgical interventions may be employed in more severe cases, where procedures like vein stripping or endovenous laser therapy can be used to address the issue. In addition to surgical methods, Ayurvedic treatments such as *basti*, *siravyadhana*, and leech therapy can complement the management of varicose veins. These therapies aim to balance the vitiated *doshas*, improve blood circulation, reduce inflammation, and alleviate associated discomfort. They are non invasive and can provide relief to patients without the need for surgical procedures, making them valuable alternatives or complementary approaches to conventional medical treatments. In nutshell, although varicose veins in the upper limbs are quite rare, they can be accurately diagnosed and effectively treated through a combination of surgical and Ayurvedic interventions.

REFERENCES

[1] Joseph N, Abhishai B, Faizan Thouseef M, Devi MU, Abna A, Juneja I. A multicenter review of epidemiology and management of varicose veins for national guidance. Ann Med Surg (Lond). 2016;8:21-27. Doi: 10.1016/j.amsu.2016.04.024. PMID: 27257482; PMCID: PMC4878844.
[2] Youn YJ, Lee J. Chronic venous insufficiency and varicose veins of the lower extremities. Korean J Intern Med. 2019;34(2):269-83. Doi: 10.3904/kjim.2018.230. Epub 2018 Oct 26. PMID: 30360023; PMCID: PMC6406103.
[3] de Ávila Oliveira R, Riera R, Vasconcelos V, Baptista-Silva JC. Injection sclerotherapy for varicose veins. Cochrane Database Syst Rev. 2021;12(12):CD001732. Doi: 10.1002/14651858.CD001732.pub3. PMID: 34883526; PMCID: PMC8660237.
[4] Ekici U, Kartal A, Ferhatoglu MF. Association between hemorrhoids and lower extremity chronic venous insufficiency. Cureus. 2019;11(4):e4502. Doi: 10.7759/cureus.4502. PMID: 31249764; PMCID: PMC6584716.
[5] Welch HJ, Villavicencio JL. Primary varicose veins of the upper extremity: A report of three cases. J Vasc Surg. 1994;20(5):839-43. ISSN 0741-5214. Available from: https://doi.org/10.1016/S0741-5214(94)70174-1.
[6] Nogaro M, Pournaras DJ, Prasannan C, Chaudhuri A. Varicose veins. BMJ. 2012;344:e667. Doi: 10.1136/bmj.e667.
[7] Fukaya E, Flores AM, Lindholm D, Gustafsson S, Zanetti D, Ingelsson E, et al. Clinical and genetic determinants of varicose veins. Circulation. 2018;138(25):2869-80. Doi: 10.1161/CIRCULATIONAHA.118.035584. PMID: 30566020; PMCID: PMC6400474.
[8] Hamdan A. Management of varicose veins and venous insufficiency. JAMA. 2012;308(24):2612-21. Doi: 10.1001/jama.2012.111352.
[9] Bhat M. A comperative clinical study to assess the effect of Manjishtadi Kshara Basti and Bhadradaruvadi Basti in Siraja Granthi (Varicose Vein). International Journal of Innovative Science and Research Technology. 2022;7(8):15-23.
[10] Kubavat HK. The role of Jalokaavacharana in the management of Sirajgranthi (varicose veins)- A case study. International Journal of Ayush Case Reports. 2018;2(1):30-35.
[11] Kazi W, Patel J, Sharma V, Panchal S. Role of Jalokaavacharana in the management of varicose veins (Sirajgranthi)-A case study. Asian Journal of Pharmaceutical Research and Development. 2023;11(4):52-55.
[12] Parihar S, Sharma D. A Brief review on herbs used in the treatment of varicose veins. Journal of Drug Delivery and Therapeutics. 2022;12(1):158-62.
[13] Sudha HM, Rao S, Siddapur C. A single case study on varicocele. Journal of Ayurveda and Integrated Medical Sciences. 2019;4(04):350-53. Doi: 10.21760/JAIMS.V4I04.687.

[14] Shastri AD. Sushruta Samhita with Ayurved Tattva Sandipika- Hindi Commentary. Reprint ed. Vol.-2. Chaukhamba Sanskrit Sansthan. Varanasi; 2007. Sutrasthan. Ch.11: 539-40.
[15] Tisi PV. Varicose veins. BMJ Clin Evid. 2011;2011:0212. PMID: 21477400; PMCID: PMC3217733.
[16] Joseph N, Abhishai B, Thouseef MF, Abna A, Juneja I. A multicenter review of epidemiology and management of varicose veins for national guidance. Ann med surg. 2016;8:21-27. Available from: https://doi.org/10.1016/j.amsu.2016.04.024.
[17] Kohno K, Niihara H, Hamano T, Takeda M, Yamasaki M, Mizumoto K, et al. Standing posture at work and overweight exacerbate varicose veins: Shimane Co HRE study. Int J Dermatol. 2014;41(11):964-68. Available from: https://doi.org/10.1111/1346-8138.12643.
[18] Cornu-Thenard A, Boivin P, Baud JM, de Vincenzi I, Carpentier PH. Importance of the familial factor in varicose disease: Clinical study of 134 families. J Dermatol Surg Oncol. 1994;20(5):318-26. Doi: 10.1111/j.1524-4725.1994.tb01631.x.
[19] Evans CJ, Fowkes FG, Ruckley CV, Lee AJ. Prevalence of varicose veins and chronic venous insufficiency in men and women in the general population: Edinburgh Vein Study. J Epidemiol Community Health. 1999;53(3):149. Doi: 10.1136/jech.53.3.149.
[20] Seidell JC, Bakx KC, Deurenberg P, van den Hoogen HJ, Hautvast JG, Stijnen T. Overweight and chronic illness- A retrospective cohort study, with a follow-up of 6–17 years, in men and women of initially 20–50 years of age. J Chronic Dis. 1986;39(8):585-93. Available from: https://doi.org/10.1016/0021-9681(86)90183-9.
[21] Seidel AC, Belczak CE, Campos MB, Campos RB, Harada DS. The impact of obesity on venous insufficiency. Phlebology. 2015;30(7):475-80. Available from: https://doi.org/10.1177/0268355514551087.
[22] Morrow JD, Frei B, Longmire AW, Gaziano JM, Lynch SM, Shyr Y, et al. Increase in circulating products of lipid peroxidation (F2-isoprostanes) in smokers. Smoking as a cause of oxidative damage. N Engl J Med. 1995;332(18):1198-203. Doi: 10.1056/NEJM199505043321804.
[23] Hickey R, Clelland R, Boyce D. Carbon monoxide: Smoking, air pollution, cardiovascular disease, and physiological homoeostasis. The Lancet. 1973;302(7828):571-72. Available from: https://doi.org/10.1016/S0140-6736(73)92397-0.
[24] Taylor BV, Oudit GY, Kalman PG, Liu P. Clinical and pathophysiological effects of active and passive smoking on the cardiovascular system. Can J Cardiol. 1998;14(9):1129-39. PMID: 9779018.
[25] Carpentier PH. Epidémiologie et physiopathologie des maladies veineuses chroniques des membres inférieurs [Epidemiology and physiopathology of chronic venous leg diseases]. Rev Prat. 2000;50(11):1176-81. French. PMID: 11008496.
[26] Clark DM, Warren R. Idiopathic varicose veins of the upper extremity. N Engl J Med. 1954;250(10):408-12. Doi: 10.1056/NEJM195403112501002.
[27] Shastri AD. Sushruta Samhita with Ayurved Tattva Sandipika- Hindi Commentary. Reprint ed. Vol-1. Chaukhamba Sanskrita Sansthan. Varanasi; 2013. Nidansthan. Ch. 11/8-9: page number-351.
[28] Garg N, Jain A. Ayurvedic perspective of varicose veins. World J Pharm Res. 2017;6(3):296-310. Doi: 10.20959/wjpr20173-7901.
[29] Whiteley MS. Current best practice in the management of varicose veins. Clin Cosmet Investig Dermatol. 2022;15:567-83. Doi: 10.2147/CCID.S294990. PMID: 35418769; PMCID: PMC8995160.
[30] Yiannakopoulou E. Safety concerns for sclerotherapy of telangiectases, reticular and varicose veins. Pharmacology. 2016;98(1-2):62-69. Doi: 10.1159/000445436. Epub 2016 Apr 23. PMID: 27104778.
[31] Brittenden J, Cotton SC, Elders A, Tassie E, Scotland G, Ramsay CR, et al. Clinical effectiveness and cost-effectiveness of foam sclerotherapy, endovenous laser ablation and surgery for varicose veins: Results from the Comparison of Laser, Surgery and foam Sclerotherapy (CLASS) randomised controlled trial. Health Technol Assess. 2015;19(27):01-342. Doi: 10.3310/hta19270.
[32] Yao PY, Mukhdomi T. Varicose vein treatment: Endovenous laser therapy. 2023 May 18. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan–. PMID: 32491651.
[33] Whing J, Nandhra S, Nesbitt C, Stansby G. Interventions for great saphenous vein incompetence. Cochrane Database Syst Rev. 2021;8(8):CD005624. Doi: 10.1002/14651858.CD005624. pub4. PMID: 34378180; PMCID: PMC8407488.
[34] Andrews RH, Dixon RG. Ambulatory phlebectomy and sclerotherapy as tools for the treatment of varicose veins and telangiectasias. Semin Intervent Radiol. 2021;38(2):160-66. Doi: 10.1055/s-0041-1727151. Epub 2021 Jun 3. PMID: 34108801; PMCID: PMC8175112.
[35] Mashetti NB, Dagu MB, Baragi UC. To evaluate the efficacy of Siravyadha and Basti in the management of Siraja Granthi (Varicose Vein) - A comparative clinical study. Journal of Ayurveda and Integrated Medical Sciences. 2017;2(05):40-46. Doi: 10.21760/JAIMS.V2I05.304.
[36] Das M, Pundir M, Patra S. Effectiveness of CAM (Complementary and Alternative Medicine) on varicose vein complications. International Journal of Endovascular Treatment and Innovative Techniques. 2023;4(1):11-18. Available from: https://doi.org/10.61797/ijetit.v4i1.263.
[37] Asutkar S, Badwe Y, Bhatbhage B. Pain management and wound bed preparation of a chronic non healing wound over heel by leech therapy-A case study. Int J Res. 2018;2(04):01-09.
[38] Sawarkar P, Sawarkar G. Management of Siraj Granthi (varicose vein) through Ayurveda. International Journal of Medical Sciences and Innovative Research (IJMSIR). 2018;3(5):131-41.
[39] Travers JP, Brookes CE, Evans J, Baker DM, Kent C, Makin GS, et al. Assessment of wall structure and composition of varicose veins with reference to collagen, elastin and smooth muscle content. Eur J Vasc Endovasc Surg. 1996;11(2):230-37. Available from: https://doi.org/10.1016/S1078-5884(96)80058-X.
[40] Sansilvestri-Morel P, Rupin A, Badier-Commander C, Kern P, Fabiani JN, Verbeuren TJ, et al. Imbalance in the synthesis of collagen type I and collagen type III in smooth muscle cells derived from human varicose veins. J Vasc Res. 2001;38(6):560-68. Available from: https://doi.org/10.1159/000051092.
[41] Berry SA, Peterson C, Mize W, Bloom K, Zachary C, Blasco P, et al. Klippel-Trenaunay syndrome. Am J Med Genet. 1998;79(4):319-26. Available from: https://doi.org/10.1002/(SICI)1096-8628(19981002)79:4<319::AID-AJMG15>3.0.CO;2-U.
[42] Revencu N, Boon LM, Mulliken JB, Enjolras O, Cordisco MR, Burrows PE, et al. Parkes Weber syndrome, vein of Galen aneurysmal malformation, and other fast-flow vascular anomalies are caused by RASA1 mutations. Hum Mutat. 2008;29(7):959-65. Available from: https://doi.org/10.1002/humu.20746.
[43] Liberthson RR, Sagar KA, Berkoben JP, Weintraub RM, Levine FH. Congenital coronary arteriovenous fistula. Report of 13 patients, review of the literature and delineation of management. Circulation. 1979;59(5):849-54. Available from: https://doi.org/10.1161/01.CIR.59.5.849.
[44] Becker DM, Philbrick JT, Walker FB. Axillary and subclavian venous thrombosis. Prognosis and treatment. Arch Intern Med. 1991;151(10):1934-43. Doi: 10.1001/archinte.1991.00400100022004.
[45] Sadick NS, Schanzer H. Combined high ligation and stab avulsion for varicose veins in an outpatient setting. Dermatol Surg. 1998;24(4):475-79. Available from: https://doi.org/10.1111/j.1524-4725.1998.tb04191.x.
[46] Lofgren Ka, Ribisi Ap, Myers Tt. An evaluation of stripping versus ligation for varicose veins. AMA Arch Surg. 1958;76(2):310-16. Doi: 10.1001/archsurg.1958.01280200132015.
[47] Rao J, Goldman MP. Stability of foam in sclerotherapy: Differences between sodium tetradecyl sulfate and polidocanol and the type of connector used in the double-syringe system technique. Dermatol Surg. 2005;31(1):19-22. Available from: https://doi.org/10.1111/j.1524-4725.2005.31008.
[48] Lazarides MK, Georgiadis GS, Papasideris CP, Trellopoulos G, Tzilalis VD. Transposed brachial-basilic arteriovenous fistulas versus prosthetic upper limb grafts: A meta-analysis. Eur J Vasc Endovasc Surg. 2008;36(5):597-601. Available from: https://doi.org/10.1016/j.ejvs.2008.07.008.
[49] Asutkar S, Khandare K. The observational study of reduction in inflammatory markers and simultaneous reduction in joint inflammation in patients of rheumatoid arthritis treated by leech therapy. Indian Journal of Forensic Medicine & Toxicology. 2021;15(1):318-25.
[50] Mashetti NB, Dagu MB, Baragi UC. To evaluate the efficacy of Siravyadha and Basti in the management of Siraja Granthi (Varicose Vein)-A comparative clinical study. Journal of Ayurveda and Integrated Medical Sciences. 2017;2(05):40-46. Doi: 10.21760/JAIMS.V2I05.304.
[51] Bramhanwade H, Jena S, Bahute PD, Bhatted SK, Dharmarajan P. Management of varicose veins through therapeutic purgation and bloodletting therapy: A case study. Journal of Indian System of Medicine. 2021;9(1):52-58. Doi: 10.4103/JISM.JISM_110_20.

PARTICULARS OF CONTRIBUTORS:
1. Postgraduate Scholar, Department of Shalyatantra, Mahatma Gandhi Ayurved College Hospital and Research Centre, Wardha, Maharashtra, India.
2. Head, Department of Shalyatantra, Mahatma Gandhi Ayurved College Hospital and Research Centre, Wardha, Maharashtra, India.
3. Postgraduate Scholar, Department of Shalyatantra, Mahatma Gandhi Ayurved College Hospital and Research Centre, Wardha, Maharashtra, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr. Shubham Bobade,
Postgraduate Scholar, Department of Shalyatantra, Mahatma Gandhi Ayurved College Hospital and Research Centre, Salod (H), Datta Meghe Institute of Higher Education, Wardha-442001, Maharashtra, India.
E-mail: drbobade9@gmail.com

PLAGIARISM CHECKING METHODS: [Jain H et al.]
- Plagiarism X-checker: Nov 27, 2023
- Manual Googling: Feb 12, 2024
- iThenticate Software: Feb 14, 2024 (9%)

ETYMOLOGY: Author Origin

EMENDATIONS: 6

AUTHOR DECLARATION:
- Financial or Other Competing Interests: None
- Was informed consent obtained from the subjects involved in the study? No
- For any images presented appropriate consent has been obtained from the subjects. NA

Date of Submission: **Nov 26, 2023**
Date of Peer Review: **Feb 05, 2024**
Date of Acceptance: **Feb 16, 2024**
Date of Publishing: **Jun 01, 2024**