



Review Article

CONCEPT OF SHADKRIYAKAALA OF VRANA BY SUSRUTHA W.S.R TO VENOUS ULCER

V.B. Binya<sup>1\*</sup>, M.M.Abdul Shukkoor<sup>2</sup>, N.H.Subi<sup>3</sup>

<sup>1</sup>PG Scholar, <sup>2</sup>Professor and HOD, <sup>3</sup>Associate Professor, Dept.of Salyatantra, Govt. Ayurveda College, Tripunithura, Kerala, India.

ABSTRACT

Acharya Susruta has described about the *Samprapthi* (pathogenesis) of *Vrana* (ulcer) in detail in *Susrutha samhitha sutrasthana*. All the ulcers like arterial ulcer, venous ulcer, trophic ulcer etc can be considered as *Vrana*. But no specific term has been made by Acharya for venous ulcer. Venous ulcers are the wounds occurring as a result of inappropriate functioning of venous valves or of venous obstruction by thrombus. While going through the characteristics of *Dushtavrana* (chronic ulcer) like *Krishna/ Suklavarna* (hyper/hypopigmented areas), *Deerghakaala anubandhitwa* (chronicity), *Durgandhitha pooyasraava* (foul smelling serous/ purulent discharge) etc, venous ulcer can be considered as a *Dushtavrana*, particularly in its chronic stage. *Sira* (vein) is the deranged anatomical component in case of venous insufficiency as well as venous ulcer and this *Sira* has been told as one of the *Vranasthaanaas* (sites of *Vrana*) by Susruta. Hence the term *Sirajadushtavrana* can be attributed to venous ulcer. Aetiopathogenesis of venous ulcer has striking similarities with that of *Dushtavrana*. In this article, a gentle attempt has been made to correlate the aetiopathogenesis of venous ulcer with the specific characteristics said in each stage of *Shadkriyakala* (aetiopathogenesis) of *Vranasamprapthi* (ulcer) as told by Acharya.

**KEYWORDS:** Venous ulcer, *Sirajadushtavrana*, *Shadkriyakala*, *Vrana samprapthi*.

INTRODUCTION

*Vrana* means splitting or tearing of the body (*Vranagatravichoornane*)<sup>[1]</sup>. The concept *Vranayathitivrana* indicates that *Vrana* can cause *Gatravaivarnyam* (discolouration of body part)<sup>[1]</sup>. Description of various types of *Vrana* (ulcer) and its management can be found even in the most ancient literatures of *Vedas*<sup>[2]</sup>. Father of Indian Surgery, great *Susruthacharya* says that the *Sampraapti* (process of pathogenesis) of *Vrana*, like any other disease, can be described only on the basis of *Shadkriyakaala*<sup>[3]</sup> (stages of aetiopathogenesis). *Vrana* can be caused either due to trauma (*Aganthuvrana*) or pathological process inside the body (*Nijavrana*). Any ulcer can be considered as *Vrana* according to Ayurveda. No specific entity has been made by Acharya for venous ulcer.

An ulcer is a break in the continuity of covering epithelium, which may be either in skin or mucous membrane, due to molecular death<sup>[4]</sup>. Among the leg ulcers, most common one is the venous ulcer<sup>[4]</sup>. Venous ulcer can be defined as a defect in pathologically altered tissue on the lower leg on the basis of (CVI) chronic venous insufficiency<sup>[5]</sup>. Non-healing and recurrence are the main problems associated with the venous ulcer<sup>[5]</sup>.

According to *Susrutha*, if a *Vrana* remains unhealed even after 7 days, it can be termed as *Dushtavrana*<sup>[1]</sup>. As the venous ulcer has a tendency of chronicity for months to years, it can definitely be considered under the heading of *Dushtavrana*. Improper functioning of *Sira* (vein) either due to valvular defect (deep vein/ perforators/ superficial vein) or thrombosis formation (deep veins/ perforators) is the primary cause of venous insufficiency of lower limbs which ultimately results in venous ulcer formation. So the term *Sirajadushtavrana* is apt here to be used for describing venous ulcer. While going through the description of *Shadkriyakaala* by *Susrutha*, we may wonder how aptly Acharya has described the unseen pathogenesis of a disease, especially '*Vrana*'. Commentaries of *Dalhana* and *Chakrapani* makes this description better to be understood by everyone. *Susrutha* also mentions about the measures to be taken in each of these six stages. The importance of understanding *Shadkriyakaala* in the present scenario is that the appropriate management said for each *Kriyakaala* if done, can give better results in healing of *Vrana* and can avoid transformation of a *Sadhyavrana* (ulcer with good prognosis) into *Asadhyavrana* (ulcer with bad prognosis).

**Shadkriyakaala (six stages of aetiopathogenesis)**

*Kriyakaala* is the *Kriyaavasara* or the specific time for doing a specific treatment in case of a disease<sup>6</sup>. *Shadkriyakaala*, i.e., Six *Kriyakaalaas* is the unique contribution of *Susrutha* which describes the complete process of pathogenesis including aetiology, prodromal symptoms, clinical features, complications and sequelae of a disease. *Vrana* (ulcer) also goes through all these six stages. The term *Kriyakaala* can be correlated with the 'aetiopathogenesis' of a disease in modern concept. *Susrutha* describes the *Shadkriyakaala* in 21<sup>st</sup> chapter of *Susrutha samhitha sutrasthana- Vranaprasna adhyaya*<sup>[6]</sup>. These six *Kriyakaalas* comprises of *Sanchaya*, *Prakopa*, *Prasara*, *Sthaanasamsraya*, *Vyakti* and *Bheda* respectively. *Aganthuvrana* starts the first stage only after the period of *Sudhavrana* i.e., seven days<sup>[7]</sup>. On the contrary, *Nijavrana* starts the first *Kriyakaala* at the time of entry of *Vrananidana* (cause of ulcer) itself. The characteristics mentioned for each *Kaala* can be correlated with the signs and symptoms seen in various stages of venous ulcer formation.

**Sanchaya (Stage of Accumulation)**

It is the first *Kriyakaala*. So definitely the role of *Nidana* (causative factors) should be incorporated with this *Kaala*. *Susrutha* says that various causative factors capable of vitiating the normal *Doshic* state (equilibrium of *Vata*, *Pitha*, *Kapha*, *Raktha*) of the body, like *Ahara* (food), *Vihara* (habits), *Rtu* (season), *Kaala* (time) etc can have an influence in this stage in our body. The various signs and symptoms of the

person at this stage are *Sthabdhapoornakoshtata* (abdominal discomfort in the form of fullness or like that), *Peethaavabhaasata* (colour change-yellow-of the body), *Mandoshmata* (mild pyrexia), *Gouravam* (feeling of heaviness), *Aalasyam* (lassitude) and *Chayakaaranavidweshha* (dislike in certain foods or habits especially in those which are involved in derangement of *Doshas*)<sup>[6]</sup>.

While considering the aetiology of venous insufficiency and subsequent venous ulcer formation, we can see the factors such as nutritional deficiency, obesity or chronic illnesses, *Vihaara* like prolonged standing and reduced physical activity as a part of job or something else etc<sup>[8,9]</sup>. These might have an influence in the general health of the patient, and obviously in the circulatory system of the body. The above said signs and symptoms of the *Sanchaya* stage can be considered as general signs and symptoms seen in a patient in the stage of onset of the disease and it is at this stage happens the initiation of aetiopathogenesis of a disease. General weakness and gastric discomfort of the body due to unseen pathogenesis occurring inside the body reflects in this initial stage.

Mild variations in biochemical investigation may be the only evidence in this stage. 4000 years ago, when these facilities were not available, the only way of hacking the unseen disease inside the body may be from these *Lakshanas* (signs and symptoms) like *Sthabdha poorna koshtatha* etc.

It can be summarized in a table as below

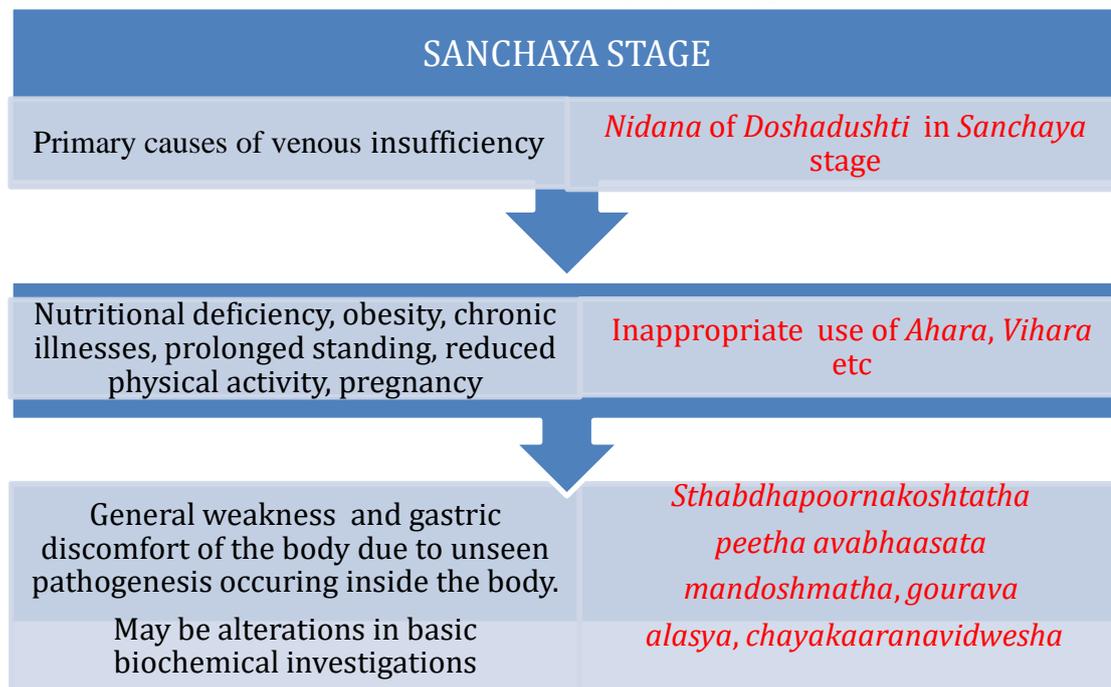


Fig 1: Comparison of *Sanchayalakshanas* with predisposing factors of venous insufficiency and venous ulcer

**Prakopa (stage of excitation)**

Aggravation and vitiation of *Doshas* (*Vata*, *Pitha*, *Kapha*, *Raktha*) here occur in a liquefied form. It occurs when some additional and more potent factors are combined along with the already existing *Chayanidanas* (causes of *Sanchaya* said in first stage). Excessive intake of unwholesome food, undesired dietary habits, various physical and mental strain, climatic and diurnal changes and suppression of natural urges will cause vitiation of *Doshas* in second stage of *Samprapthi*. All the *Doshas* are firmly incorporated in the vitiation of *Doshas* here. *Athivyayama* (inappropriate exercises), *Abhighata* (trauma), *Ratrijagarana* (sleepless nights), *Bhaaraharana* (weight lifting), *Padaaticharya* (increased walking and travelling), *Katu-kashaya-Thiktha-Rooksha-Laghu-Seetha veeryaahara* (spicy, dry, cold foods), *Vishamasana* (incorrect timings of food), *Adhyasana* (heavy food), foods like *Sushkasaka* etc (dried leafy vegetables), *Vegadharana* of *Vata*, *Mutra*, *Pureesha* etc (suppression of urges of rectal gas, urine, stool), *Seethakala* (cold climate), *Pravata* (cold breeze), *Varshakaala* (rainy season) etc can cause vitiation of *Vatadosha*<sup>[6]</sup>.

Mental factors like *Krodha* (anger), *Soka* (depression), *Bhaya* (fear) etc, *Katu-amla-lavana-theekshna-ushna-laghu-vidahiahara* (spicy and junk food), *Godha-matsya-aja-avikamamsa* (unwholesome non vegetarian dietary habits), *Sura* (alcohol), *Ushnakaala* (summer season), hot climate in specific geographical areas, *Madhyahna* (working under sunlight in noon etc) etc can cause *Pitha* vitiation<sup>[6]</sup>. The same factors may be responsible for the vitiation of *Raktha* also as both these *Doshas* are inherently associated in a close relationship. *Kapha* vitiating factors which are relevant here are *Divaswapna* (day sleep), *Avyayama* (laziness and sedentary habit), *Aalasya* (laziness), *Madhura*, *Amla*, *Lavana*, *Tila*, *Dadhi*, *Krisara*, *Paayasa* (sweets, junk foods etc), *Ikshuvikara*, *Anupa-oudaka Mamsa* (unwholesome non vegetarian foods), *Adhyasana* (overeating) etc.<sup>[6]</sup>

Predisposing factors of venous ulcer are overweight, obesity, restricted physical activity, depression, family history, chronic constipation etc<sup>[8,9]</sup>. Chronic illnesses which can affect anatomical structure and functional integrity of veins are hypertension, diabetes mellitus, arterial fibrillation, heart diseases, musculoskeletal disorders, high cholesterol etc<sup>[8,9]</sup>. So the risk factors of these life style disorders including obesity can be included under *Dosha prakopaka nidanas* (cause of vitiation of *Doshas*). Risk factors of varicose vein are multiparity, heredity, traumatic history of lower limbs, obesity, prolonged standing, profession as athletes, pregnancy, old age etc<sup>[4]</sup>. In old people, atrophy and weakness of venous wall and valves may happen which is a strong predisposing factor behind the improper functioning of lower limb veins and subsequent formation of ulcer. In obese patients, excessive fatty tissue will result in poor venous circulation and increased venous pressure. Moreover their venous valves may not be patent also.

In case of an athlete, forceful contractions of calf muscle lead to reverse blood flow and valve damage, while in sedentary people and people having long-standing occupation, the pressure exerted over the venous valves by the blood column results in valvular damage, dysfunctioning of calf muscle pump and increased venous hypertension<sup>[4]</sup>. Minor trauma may be the cause of venous ulcer formation if he has an already vitiated venous system.

These can be summarised as below:

**Table 1. Dosha Prakopanidanas and Predisposing Factors of Venous Ulcer: A Comparison**

Causative factors	Factors causing Vatakopa	Factors causing Pitha/Rakthakopa	Factors causing Kaphakopa	Predisposing factors of venous insufficiency and varicose vein formation
<b>Ahara</b>	<i>Katu</i> , <i>Kashaya</i> , <i>Thiktha</i> , <i>Rooksha</i> , <i>Seethaahara</i> , <i>Vishama asana</i> , <i>Adhyasana</i> Foods like <i>Sushkasaka</i> (dry vegetables)	<i>Katu</i> , <i>Amla</i> , <i>Lavana</i> , <i>Teekshna</i> , <i>Ushna</i> , <i>Vidahiahara</i> , <i>Mamsa-godha</i> , <i>Matsya</i> , <i>aja</i> , <i>avika</i> , <i>Sura</i> ( <i>drava</i> , <i>Snigdha</i> , <i>Guru ahara</i> , <i>Virudha</i> , <i>Adhyasana-rakthakopa</i> )	<i>Madhura</i> , <i>Amla</i> , <i>Lavana</i> , <i>Seethe</i> , <i>Snigdha</i> , <i>Guru</i> , <i>Pichila</i> , <i>Abhishyandhiah ara Ahara</i> like <i>Tila</i> , <i>Godhuma</i> , <i>Yavaka</i> etc, <i>Adhyasana</i>	Improper dietary habits (Spicy foods, Junk food Fast food, untimely food habits Alcohol consumption Bakery sweets and high calorie diet) leads obesity, diabetes mellitus, high cholesterol, hypertension etc.
<b>Vihara</b>	<i>Athivyayama</i>	<i>Srama</i> ( <i>Raktha</i> )		Athletes, heavy strenuous works

	<i>Athivyavaya</i>	<i>Maidhunopagamana</i>		Indulgence in increased sexual activities- similar effect of strenuous works and exercises
		<i>Divaswapna (raktha)</i>	<i>Divaswapna Avyayamaalasya</i>	Day sleep- obesity, sedentary life style long time standing occupation, restricted physical activity
	<i>Abhighata</i>	<i>Abhighata (Raktha)</i>		Trauma, surgery
	<i>Bharaharana</i>			Weight lifting, strenuous works
	<i>Padaaticharya</i>			Log time walking and travelling, long standing job
	<i>Vegadharana</i>			Chronic constipation
<b>Mental factors</b>	<i>Ratrijagarana,</i>	<i>Krodha, Soka, Bhaya</i>		Emotional stress and depression
<b>Environmental factors</b>	<i>Seethakala, Pravata, Varshakala</i>			Cold climate- (contraction of blood vessels, reduced blood circulation in arteries, improper venous drainage)
		<i>Ushnakaala Madhyahna (Anala, Ataparaktha)</i>		Summer season and working under heavy sunlight (weakness of muscles-improper circulation and venous drainage)

In this second stage of *Samprapthi* also, no manifestation of the specific disease can be seen. The *Prakopalakshanas* are *Koshtatoda sancharana* (abdominal discomfort), *Amleeka* (burning sensation in chest), *Pipasa* (thirst), *Paridaha* (burning sensation in chest), *Annadweshya* (anorexia) etc<sup>[6]</sup> and these symptoms can be considered as the general signs and symptoms of the pathological process happening inside the body due to a disease. As the factors like reduced exercise, prolonged standing, dependency, improper functioning of calf-muscle pump mechanism etc have been told in the aetiopathogenesis of varicose vein<sup>[4]</sup>, a *Vata-Kapha Prakopa* leading to an additional *Rakthaprakopa* (both *Rakthavaha srothas* and *Raktha dhathu dushti*) can be seen in this case. Likewise, the factors like change in contents and texture of blood resulting in increased viscosity and thrombus formation can be seen in the aetiopathogenesis of deep vein thrombosis, so a *Pitha-raktha- Kapha prakopa* finally associated with a *Vataprakopa* may be told as happened here. So here all the *Doshas* i.e. *Vata, Pitha, Raktha* and *Kapha* has been involved in the second *Kriyakaala* of *Siraja dushtavrana*.

#### **Prasara (spreading stage)**

*Doshas* start spreading in this stage. *Susrutha* explains this spread symbolically as an overflowing

like the mixture of yeast, water and flour<sup>[3]</sup>. *Vata* is the main cofactor playing in this third *Kriyakaala*. *Doshas (Raktha, Pitha, Kapha)* vitiated and liquefied in the second *Kriyakala* move away from its natural sites in this stage with the help of *Vayu* and they move inside the whole body or half or sometimes only a part of the body (*Kritsneardheavayaveva*)<sup>[6]</sup>. Here it is better to think that *Prasara* happens in *Ardhaanga* (lower half of the body), in the sense that only the lower limb venous system is involved in the pathophysiology of venous ulcer. *Vayu* is the causative agent of the spread because of being mobile even though inconspicuous (*Vayorgatimatwa*). The spreading *Doshas* can break the barrier and this spread may happen either to individual *Doshas* or combination of *Doshas*. Hence totally, there are 15 types of *Prasara* occurring in the *Vranasamprapthi* like *Vata, Pitha, Kapha, Raktha, Vatapitha, Vataraktha, Vatakapha, Pithakapha, Pitharaktha, Kapharaktha, Vatapitharaktha, Vatakapharaktha, Vatapithakapha, Pithakapharaktha* and *Vatapithakapharaktha*<sup>[6]</sup>.

Unwholesome dietary habits, seasonal variations and activities of a person said as the predisposing factors of venous insufficiency and varicose vein formation can have an influence over the vital systems in our body like circulatory system,

musculoskeletal system, and gastrointestinal system which are the main systems involved in the formation and purification of blood and maintenance of good blood flow in the body. As it is the circulatory dysfunction that happens inside the *Sira* (veins) in the pathology of *Sirajavrana* (venous ulcer), *Vyanavayu* is the *Dosha* of vitiation here and the vitiated *Dhatu*s are *Rasa* and *Raktha* inside the vein and *Mamsa* and *Medus* in the structural base of venous wall and its valves. As some constitutional changes in the blood and impairment of circulation happens even before the manifestation of engorgement of veins and skin changes in lower limb, *Prasara* stage may be correlated with this prior to manifestation stage of varicose vein and deep vein thrombosis.

While describing the *Prasara Samprapthi* (pathogenesis in third stage), Acharya says that the vitiated *Doshas* can probably stay inside its *Maarga* (pathway- here it is the circulatory system) for a long time without causing any symptoms (*naathyarthamkupithascha api leeno maargeshu tishtathi*) and when the favourable circumstances come or if proper treatment is not taken in this stage, it can just go to the stage of disease manifestation as soon (*kaalena hethumaasaadya kupyathi*)<sup>[6]</sup>. In case of varicose veins and venous insufficiency also, if the patient is taking proper diet and using proper prophylactic measures like use of stockings, compression bandages, exercises etc even from the starting stage itself, he can prevent varicose vein and venous ulcer formation<sup>[5]</sup> and when he doesn't mind it, these diseases can manifest spontaneously. And also its very interesting to note that most of the *Prasaralakshanas* told by *Susrutha* can be seen in early pathogenesis of venous insufficiency also prior to the manifestation of ulcer and these *Lakshanas* are: 1. *Vimargagamana* due to *Prasara* caused by *Vata* (abnormal flow of *Dosha*, here either the reverse flow of blood through the same vein or recanalization in venous incompetency), 2. *Osha*, *Chosha*, *Paridaha*, *dhoomaayana* etc caused by *Pitha prasara*- can be correlated with various types of pain, discomfort and burning sensation felt by patient in starting stage of venous insufficiency and prior to the formation of varicose veins) and 3. *Angasada* (weakness of body) caused by *Kaphaprasara* (prodromal symptom of lower limb venous insufficiency and varicose vein)<sup>[6]</sup>. Modern texts say that it is at the starting stage of venous incompetence and varicose vein that the pain and discomfort is maximum for the patients.

### ***Sthanasamsraya* (Localisation)**

In the fourth *Kriyakaala*, *Dosha Dushya Sammurchana* occurs and according to Chakrapani, it will be *Sookshma*<sup>[7]</sup>, in the sense it may be happening

at a tissue, cellular or molecular level. *Doshas* which got aggravated and spread inside the body (by second and third *Kriyakaalas*), if doesn't get properly managed can be localized somewhere else inside the body (*Srothas*) and produce some signs and symptoms, but not the actual disease manifestation, rather the *Poorvarooopa* (prodromal symptoms) of disease manifest<sup>[7]</sup>. *Viseshapoorvarooopa* (specific prodromal symptoms) helps us to identify the main *Dosha* involved in the disease. According to *Susrutha*, *Poorvarooopa* of *Vrana* (especially *Nijavrana*) is *Vranasopha*<sup>[7]</sup>. *Vranasopha* can undergo *Paka* if untreated. Leg oedema and ankle flair which occurs in venous insufficiency prior to the ulcer formation can be compared with *Vranasopha*. But it is better to consider its tissue and cellular level also.

Acharya says that *Grandhi* can occur if the vitiated and spread *Doshas* get localized in *Medodhatu*<sup>[6]</sup> and the *Dushyas* of *Grandhi* are *Mamsa*, *Medas* and *Raktha*, the same structural and functional base of *Sira* (vein). Due to the dysfunctioning of valves and calf-muscle pump mechanism, varicosity appears in superficial veins which are otherwise known as *Siragrandhi* which can be considered as a *Sopha* in tissue level (tissue here is one among the *Rakthavahasrothuses*- *Sira*). Prior to the formation of ulcer, inflammatory changes like fibrin cuff formation, leukocyte trapping in vessels involved in cutaneous circulation and subsequent intercellular fluid accumulation etc occur locally in the malleolar and perimalleolar region<sup>[5]</sup>. These changes can be considered as *Sopha* in both tissue and cellular level. According to *Susrutha*, *Kushta* is the manifestation (*Poorvarooopa*) seen if *Sthanasamsraya* of *Doshas* occurs in *Twak*- *Mamsa*- *Sonitha Dhathus*. Hyperpigmentation and eczematous changes happening in skin prior to the venous ulcer formation may be considered as *Twakvikara* i.e., *Kushta*<sup>[6]</sup>.

Since among these, only the *Sopha* in the form of lower limb oedema is visible by naked eye, only that can be used to identify the *Dosha* predominance in *Sthanasamsraya* stage of *Vrana samprapthi*. This *sophapoorvarooopa* is applicable only for *Nijavrana* as the *Aganthuvrana* happens without any *Poorvarooopa*. *Vranasopha* is to be examined by three means- *Darsana* (inspection), *Sparsana* (palpation) and *Prasna* (history taking).

*Viseshalakshana* (specific signs and symptoms) of *vranasopha* is as follows<sup>[6]</sup>:

- a. *Vatasopha*- Black or *Arunavarna*, rough or soft on touch, with intermittent pricking or other various types of pain.
- b. *Pithasopha*- Yellow or red in colour, soft, undergoes *Paka* very rapidly and with various types of *Pithaja* pain.

- c. *Kaphaja soph*a- white, hard, smooth, having itching, cold on touch, undergoes *Paka* very slowly.
- d. *Sannipatha Sopha*- has the *lakshanas* of *Vata*, *Pitha* and *Kaphasophas*.
- e. *Rakthaja soph*a- similar to *Pithasopha*, colour may be black.
- f. The *Sopha* which is associated with *Aganthuvrana*- symptoms of *Pithaja* and *Rakthajasopha*, colour more reddish like blood.

#### Vyakthi (stage of disease manifestation)

If proper treatment is not done in *Poorvaroopa* stage, *Sopha* will attain *Pachyamaana* or *Pakwa* stage. Fifth stage of *Samprapthi* follows the *Pakwavastha*<sup>[7]</sup>. The *Pakwasopha* bursts naturally or a *Sastravrana* (surgical incision) should be created for the removal of pus at this stage. Thus a break in the continuity of skin develops in *Nijavrana*. In an *Aganthuvrana*, this fifth stage is happening first. Both the *Samanya* and *Visesha Lakshanas* can be found in fifth *Kriyakaala*. *Vyakthi* is the stage where *Lakshana*

of disease becomes clear (*Vyaktha*) and by definition, *Vrana* means *Gatravichurnana*<sup>[7]</sup>, which means destruction or split of tissue or body part. So the *Vyakthi* stage of *Vrana* starts from the loss of skin or mucous membrane i.e., formation of venous ulcer. So it is at this stage, the disease is known as *Siraja Dushtavrana*.

#### Samanya Lakshana of Vrana

Pain (*Ruk*) is the *Samanyalakshana* of *Vrana*, because it is the common symptom found in all *Vranas*<sup>[7]</sup>. Only the nature of pain varies according to the *Doshas* involved which is to be considered as *Viseshalakshana*.

#### Viseshalakshana of Vrana<sup>[1]</sup>

Specific symptoms as differentiated by the involvement of specific *Doshas* can be considered as the *Visesha Lakshanas* of *Vrana*. There are fifteen different combinations of *Doshas* mentioned in *Vrana* by Acharya Susrutha. Nature of pain, colour, discharge etc is different for different types of *Vranas* according to the *Doshik* combination.

**Table 2: Vranalakshanas and Characteristics of a Venous Ulcer: A Comparison**

<i>Vatajavrana</i>	<i>Pithajavrana</i>	<i>Kaphajavrana</i>	Venous Ulcer
Colour: Syava	Colour: <i>Neelabha</i>		Hyperpigmentation, necrosed tissue, eczema, bluish discolouration due to pooling of deoxygenated blood in veins.
Colour- <i>Arunabha</i>	<i>Raaga</i>		Typical eczematous lesion of surrounding skin
	Colour: <i>Peetha</i>		Slough tissue/ stage of microbial infection
		Colour: <i>Pandu</i>	Pale granulation/ non-granulation tissue in the floor, epithelialisation, white atrophy or hypopigmented areas
Texture: <i>Rooksha</i>		Texture: <i>Kadina</i> , <i>Sthoolaoshta</i>	Fibrosis, necrosis, scar tissue, hypertrophied texture in the floor or slightly indurated edge or base of venous ulcer
Pain: <i>Toda</i> , <i>Bheda</i> , <i>Ayama</i>		Pain: <i>Mandavedana</i>	Pain is a feature of venous ulcer-mild/ sharp
Discharge: <i>Thanu</i> , <i>Alpasrava</i>			Scanty discharge
Discharge: <i>Pichila</i>		Discharge: <i>Sukla</i> , <i>Seetha</i> , <i>Sandra</i> , <i>Pichila</i> , <i>Guru</i>	Serous discharge/ purulent discharge in infected stage of venous ulcer
	Discharge: like water mixed with <i>Kimsuka</i> flower (red)		Serosanguinous/ sanguineous discharge
	Discharge: <i>Ushna</i> , <i>Poothisrava</i>		Color and foul smelling discharge especially when infected

		<i>Aasrava</i>	Discharge may be more especially in infected stage
	Time: <i>Kshipra</i>		Sometimes spontaneously formed
		<i>Kandu</i>	Itching is a feature of venous ulcer
	Associated features: <i>Daha, Paaka, Peethapitaka, Vikarakari</i>		Fever and inflammation is a sign of infection in venous ulcer may be because of microbes
		<i>Sthabdhāsira, Snayujaala</i>	Tortuous veins or telangiectasia in surrounding areas.

By assessing these symptoms, we can say that generally in a venous ulcer, *Lakshana* of *Vataja* and *Kaphajavranas* predominate and once it get infected, the *Lakshanas* of *Vataja* and *Pithajavranas* predominate.

### **Bheda (Stage of Chronicity and Complications)**

If the *Nijavrana* or *Aganthuvrana* is not properly treated, it becomes chronic and reaches the sixth stage of *Samprapthi - Bheda*. Also *Dushtavrana* is the *Bhedavastha* of diseases like *Pramehapitaka, Vidhradhi, Visarpa, Kushta* and many other similar diseases.

**Table 3: Dushtavrana lakshanas<sup>[7]</sup> and Signs and Symptoms of CVU – A Comparison**

<b>Susrutha</b>	<b>Chronic Venous ulcer</b>
<i>Atisamvrutha</i>	Edge being not united though stays together, is a sign of non-healing of ulcer. Also a feature of malignancy
<i>Athivivrutha</i>	Sometimes large/ expanded, Sign of non healing ulcer
<i>Athikadina</i>	Slight/ moderate level of induration due to chronicity, fibrosis, scar, necrotic tissue etc. Feature of malignant ulcer also
<i>Athimridu</i>	Loose consistency due to inflammation of underlying tissues
<i>Utsanna</i>	May be raised rarely
<i>Avasanna</i>	Indicates depth of the ulcer (usually venous ulcer is shallow)
<i>Atiushna</i>	Calor is sign of inflammation
<i>Atiseeta</i>	May be a sign of ischemia (arterial insufficiency may be associated with venous ulcer)
<i>Krishna</i>	Gangrene/necrosis/hyperpigmented surroundings
<i>Raktha</i>	Bleeding from the ulcer and on touch also, may be a feature of malignancy
<i>Peetha, sukla</i>	Pale granulation tissue is a sign of non-healing
<i>Bhairava</i>	Irregular surface and edges due to chronicity, scar tissue, or malignant changes
<i>Poothipooya</i>	Foul smelling discharge especially if infected by microbes
<i>Poothimamsa</i>	Infection affects underlying tissues which leads to putrefaction
<i>Poothisira</i>	Infection affects blood vessels and nerves which may undergo putrefaction
<i>Poothisnayu</i>	Degeneration of underlying ligaments, tendons etc due to infection and subsequent putrefaction
<i>Dushtarakthasrava</i>	Serosanguinous/sanguinous discharge
<i>Amanojnagandha</i>	Foul smell, due to infection, necrosis, gangrene formation or malignant changes
<i>Amanojnadarsana</i>	Due to infection, necrosis, gangrene formation or malignant changes
<i>Athyarthavedana</i>	Sometimes very painful
<i>Athyarthadaha</i>	Symptom of Infection
<i>Athyarthapaka</i>	Symptom of Infection
<i>Athyartha raga</i>	Rubor, sign of Inflammation
<i>Pitaka</i>	Symptom of Infection
<i>Kandu</i>	Itching is a feature of venous ulcer

<i>Sopha</i>	Ankle flare / leg oedema is an associated symptom
<i>Deerghakaalaa nubandhi</i>	Chronicity is the most important feature of a non-healing venous ulcer
<i>Utsangi</i>	Affects the underlying tissues/ spreading venous ulcer.

Invasion of microorganisms like streptococcus, staphylococcus, proteus species, fungi etc can occur in a chronic venous ulcer which makes it an infected one. The infection makes it a non healing one and is difficult to cure with the general management of ulcer. Malignant transformation of the chronic venous ulcer is known as marjolin's ulcer and it is the deadly complication of this ulcer. It is a condition with bad prognosis. Some of the symptoms told by Acharya in *Dushtavrana* can be compared with the poor prognostic features of malignant or premalignant condition also.

#### Management of disease in each *Kriyakaala*<sup>[3]</sup>

1. *Sanchaya*: Prophylactic measures, starting of medicines considering the *Dosha* vitiation
2. *Prakopa*: All *Doshas* are vitiated here. If *Vataprakopa* at the site *Pitha*, *Pithahara* treatment should be given and similarly the predominant *Dosha* and the site should be assessed and treated in the similar manner.
3. *Prasara*: Upto this stage, treatment for cause and symptoms should be given rather than disease
4. *Sthanasamsraya*: treatment for *Dosha* and *Dushya*.
5. *Vyakthi*: treatment contrary to disease is to be given
6. *Bheda*: Incurable

#### DISCUSSION

The concept of *Shadkriyakala* contributed by Susrutha is the best way of explaining the Aetiopathogenesis of a disease. Besides the mere clinical features of the disease, these six *Kriyakalas* can describe all the aspects of the disease like aetiology, pathophysiological changes, complications and characteristics of chronicity of a disease. While considering the complete pathological changes of venous ulcer, the apt term which can be given for it is *Siraja dushtavrana*.

In the first *Kriyakala* (*Sanchaya*), various causative factors capable of vitiating the normal *Doshic* state of the body like *Ahara*, *Vihara*, *Rtu* etc can produce some *Lakshanas* in the body like *Sthabdha poornakoshtatha*, *Mandoshmatha*, *Chayakarana vidweshya* etc. The same things happen in aetiopathogenesis of venous ulcer also. Nutritional deficiency, obesity, chronic illnesses, reduced physical activities etc can cause general weakness and gastric discomfort which are the generalized manifestation of a disease pathogenesis happening inside the body. So this stage can be compared with

the first *Kriyakaala*. In *Prakopa*, which is the second *Kriyakaala*, the same causative factors do persist but some additional and potent factors makes the condition worsen and the vitiation of *Doshas* happens in an aggressive form, still in unmanifested condition. Various causes of *Vata* vitiation like *Ativyayama*, *Abhighata*, *Padaaticharya*, *Katu-rooksha Ahara*, the causes of *Pitha- Raktha Prakopa* like *Krodha*, *Soka*, *Katu-Thiktha Vidahi Ahara*, *Sura*, *Ushna Kala* etc and the causes of *Kapha Prakopa* such as *Avyayama*, *Alasya*, *Madhura- Amla- Lavana Ahara*, *Dadhi*, *Krisara*, *Mamsahara* etc can cause various *Lakshanas* in the body like *Koshtatoda Sancharana*, *Paridaha*, *Annadweshya* etc. In modern concept, venous insufficiency, varicose vein and deep vein thrombosis are the basic pathologies happening prior to the manifestation of venous ulcer. The predisposing factors of the former pathologies can be included under *Prakopa nidanas* and these factors are improper dietary habits like spicy food, fast food, bakery sweets, alcohol consumption, high calorie diet etc which causes obesity and various chronic and life style disorders (diabetes mellitus, hypertension etc) heavy strenuous works, sedentary lifestyle, long time standing occupation, restricted physical activities, long time walking, chronic constipation, emotional stress, depression, extreme hot and cold climate etc.

In *Prasara*, the third *Kriyakala*, the *Doshas* spread to other sites either individually or in combination to produce symptoms like *Vimargagamana*, *Osha*, *Chosha*, *Paridaha dhumayana*, *Angasada* etc. The *Doshas* exist in *Leena* state here as remain suppressed until it gets favourable circumstances to get manifested as a disease. Prior to the manifestation of ulcer, abnormal flow of blood in lower limb veins, recanalisation, discomfort, pain and burning sensation felt in lower limb veins can be compared with the *Prasara lakshanas*. *Sthanasamsraya* is the fourth *Kriyakala*, when localisation of disease happens. Here, varicose vein (*Siragrandhi*) formation and thrombus formation inside deep veins, ankle flair and lower limb oedema, various inflammatory and pathological changes like fibrin cuff formation and white cell trapping can be taken as *Sopha* occurring in various levels such as tissue, cellular and molecular levels. *Sopha* being the *Poorvaroopo* of *Vrana* is the feature of *Sthanasamsraya* stage.

Manifestation of the disease in its entire form happens in fifth *Kriyakala*- '*Vyakthi*'. All the clinical features of venous ulcer such as slight pain, serous or

serosanguinous or seropurulent discharge, chronicity, slight induration of edge and base of ulcer due to its chronic nature etc can be seen in venous ulcer also. *Bheda* is the last *Kriyakaala*, which is said to be incurable according to *Acharya*. It is the stage of ominous structural abnormalities and complications happening in a venous ulcer. Infection by microorganisms and subsequent non-healing occurs as a complication in this last stage. It is better to check the deadly complication of venous ulcer also in this stage i.e., marjolin's ulcer which is the malignant transformation happening in a venous ulcer. Prognosis is bad for a malignant ulcer.

## CONCLUSION

*Shadkriyakaala* of *Vrana* described by Susrutha can be correlated with different stages of aetiopathogenesis venous ulcer. The changes happening inside the body which can't be seen by the surgeon before the manifestation of ulcer may become evident from the other signs and symptoms which might think to be irrelevant in the manifestation of that particular disease. If a surgeon is able to understand the correct *Kriyakaala*, he gets a chance to select the apt treatment said for that particular stage and thus the quality of treatment and that of life of the patient can be improved. So understanding the stage of *Samprapthi* of *Vrana* can be said as beneficial in venous ulcer management which otherwise has a tendency to become chronic.

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### \*Address for correspondence

**Dr V.B. Binya**

PG Scholar,

Dept. of Salyatantra,

Govt. Ayurveda College,

Tripunithura, Kerala, India.

Email: [binyaprabhakar@gmail.com](mailto:binyaprabhakar@gmail.com)

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