



EFFECT OF JALAUKAVACHARANA AND TRIPHALA KWATH AVAGAHA IN THE UPTAKE OF SPLIT SKIN GRAFT IN CHRONIC NON-HEALING ULCER OF LOWER LIMB IN SICKLE CELL DISEASE- A CASE STUDY

Ayurveda

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ABSTRACT

Chronic wound is defined as wound that have failed to proceed through orderly process that produces satisfactory anatomic and functional integrity. Majority of wound that have not healed in 3 months are considered as chronic wounds. Poor perfusion or oxygenation or excessive inflammation contribute to causation and perpetuation of chronicity of wound. Sickle cell syndromes are caused by a mutation in the β globin gene that changes the 6th amino acid from the glutamic acid to valine. It is an Autosomal Recessive Haemoglobinopathy. Commonest symptoms are leg ulcers which are non-healing and difficult to treat. These ulcers possess a therapeutic challenge with multiple modalities. In this single case study the patient with non-healing chronic ulcer over leg has been treated by Jalaukavacharan (Leech therapy) to achieve healthy granulated wound bed and further undergone for split thickness skin grafting and the graft uptake was satisfactory.

KEYWORDS

Chronic Non-healing Ulcer, Sickle Cell Disease, Leech Therapy, Jalaukavacharan, Split Thickness Skin Graft

Wound is an injury to body which typically involves laceration of skin membrane and damage to underlying tissues.¹ Venous insufficiency, arterial insufficiency are major conditions for developing wounds in lower extremities.² In *Ayurveda*, the wound which is difficult to heal is termed as *Dushta Vrana*³ i.e. chronic non-healing ulcer. *Dushta Vrana* is a long-standing ulcer where removing debris and enabling granulation tissue formation is more important. Factors affecting healing of wound are 1. Age of patient: Hospitalised surgical patients has a direct correlation between age and poor wound healing. 2.Type of wound: Larger wound take longer time to heal. 3.Infection: Skin breaks allow viruses, bacteria, fungi to enter the wound site. 4.Diseases like Diabetes Mellitus, Malnutrition and Vitamin deficiencies, Cancer and widespread use of drugs impairs wound healing.⁴ Efficient wound healing requires good blood flow to wound site. 5.Poor Nutrition: It causes the body to have insufficient resources to heal the wound. Wound exude large quantities of protein daily further depleting body's ability to heal. 6.Lack of hydration at the surface of wound can deplete cellular migration, decrease blood oxygenation delaying wound healing. 7.Poor blood supply causes hypoxia i.e. low oxygen tension has deleterious effects on all aspects of wound healing.⁵ Factors affecting local oxygen delivery includes low blood volume or arterial insufficiency.

Sickle Cell Disease (SCD) is an autosomal recessive haemoglobinopathy. It is caused by a mutation in the β globin gene that changes the 6th amino acid from the glutamic acid to valine. Patient with SCD have sickling of red blood cells which leads to vascular occlusion and impairing oxygen delivering to tissues causes vasoconstriction subsequently it leads to ulcer formation.^{6,7} Once the ulcer has formed it takes prolonged course to recovery. It has been known for a long time that leg ulceration is a commonest complication in homozygous sickle cell anaemia (SS). Between 8% and 10% of sickle cell patients develop leg ulceration between the ages of 10 and 50 years.⁸ Sickle cell leg ulcers persist for a longer duration of time which occurs either spontaneously or because of local trauma. Leg ulcers are responsible for frequent complications because they are often long lasting and are highly resistant to therapy. Hence, Patient with SCD require ongoing continuity of care. In spite of advances that have been made, management of chronic non-healing ulcer (NHU) is still a big challenge in surgical fraternity. Even though healing is a physiological process, it is inhibited by various factors. In this case study factors affecting wound healing was a large surface area of wound and sickle cell disease.

In *Ayurveda Sushruta* has mentioned *Shashthi Upakrama*⁹ i.e. sixty procedures for wound management. He has mentioned *Visravana* (Blood-letting) by means of *Raktamokshana* in *Vranashopha*, *Kushtha*, *Visarpa*, *Pidaka*, *Arsha*, *Vidradhi* etc.¹⁰ and strictly advised *Jalaukavacharan* in chronic and contaminated wounds. *Jalaukavacharan* is used to reduce local inflammation in the tissue i.e. Antiphlogistic.¹¹ *Jalauka* improves microcirculation¹² and reduces blood coagulation. *Jalauka* sucks blood by self-regulatory

mechanism. *Jalauka* exerts local effect in wound due to several active substances emitted into it during sucking. *Jalauka* enhances granulation tissue formation¹³ hence we had selected this patient for above treatment protocols.

CASE REPORT

Study was conducted at Shri Ayurved Mahavidyalaya & Pakwasa Samanvaya Rugnalaya, Nagpur. A male patient of age 23 years with known case of Sickle cell disease (SS pattern) presented at our OPD with complaints of Chronic wound at left leg extending from lower end of tibia up to lateral malleolus invading circumferentially lower 1/4th of leg since last 1 year, swelling over left leg and pain at wound site since 10 days. Patient came with previously dressed wound with foul smelling, soaked bandage due to discharge through wound. He had history of insect bite over left leg (lateral aspect, 6cm above lateral malleolus). Then he developed itching at bite site after 10-12 days. Later-on, there was blackish discoloration around the insect bite site and wound formed. Wound remain untreated for longer duration and got infected. Patient had taken previous treatment for wound from other private hospitals and was treated with various antibiotics and wound dressings. But due to chronicity and non-healing of wound patient lost all his hopes so ultimately wound remains unhealed since one year. Patient didn't have history of any previous illness like Hypertension, Diabetes Mellitus, Pulmonary Koch's, Bronchial Asthma. He was habituated for long hours standing in his private job as a Chef for 14 to 16 hours continuously since last 6 years. Patient had a thin built with normal vital parameters. Informed written consent was taken from the patient for documentation and publication of case history. General clinical examination was done. He had pallor due to anaemia. No hepatosplenomegaly was found per abdominally.

Local Examination

On removing the foul smelling dressing, the wound was found irregular and sloughy edges with profuse slough and unhealthy granulation tissue on the surface.

1.*Vrana Akrti* : Large irregular wound on left leg extending from lower end of tibia up to lateral malleolus measuring 15 *20 cm in length and breadth invading circumferentially lower 1/4th of leg. Skin deep depth was found approximately 4mm to 5mm. *Ativistrutta vrana* (Larger surface area of wound), *Utsanna vranoshtha* (Elevated margin).

2. *Sparsh* : Wound margins and surface was *Shlakshna* (sloughy and irregular).

3. *Gandha* : *Visragandha* i.e. foul smelling wound.

4. *Strava* : Sero-purulent discharge was present.

5. *Vedana* : Painful grade 5 according to Visual Analogue scale.

6. *Varna*: Yellowish Slough with unhealthy granulation tissue.

Wound was daily assessed as per the *Vrana Pariksha*¹⁴ i.e. described by *Sushruta* and modern criteria like granulation tissue formation and wound bed formation.

On this basis, it was diagnosed as *Dushta vrana (kapha-pittaj vrana)* (chronic non-healing ulcer) of left leg.

LAB Investigations:

Table No. 1: Blood Investigations

WBC	16060/cumm	Sr. creatinine	0.82mg%	Sr. bilirubin	total: 1.92 mg%
RBC	2.99*10 ¹² /cumm	Sr. urea	21mg%		direct: 0.32mg %
HB%	8.4 gm/dl	B.T.	1min 50 sec		indirect: 1.60mg %
platelet	3.41 lacs/cumm	C.T.	4min 55 sec	SGOT	45mg%
RBS	110mg/dl	urine examination	normal, no pus cells	SGPT	36mg%
HIV	Negative	Blood group	AB Rh positive	Sr. alkaline phosphate	102IU/L
HBsAg	Negative	Sr. potassium	3.42 meq/L	Sr. sodium	121.5 meq/L

Table No. 2: Pus Culture & Sensitivity Report

X ray left leg	No other pathology detected
Pus culture report	Proteus mirabilis organism isolated
Sensitivity report	sensitive for cefotaxime, cefixime, ceftriaxone, ceftazidime, cefepime, gentamicin, amikacin, piperacillin tazobactam, cefoperazone sulbactam, imipenem and meropenem.

MATERIAL AND METHODOLOGY

After all investigations *Jalaukavacharan* was planned as a first line of treatment along with *Vrana Dhavana* (wound cleaning) with *Triphala Kwath* and *Lekhana Karma*¹⁵. Supportive treatment for internal use was given as follows: Injection Ceftriaxone 1gm intravenously twice per day for 3 days, *Triphala Guggul* 2 tablets twice a day, *Amruta Guggul* 2 tablets twice a day. After formation of *Shuddha Vrana* or wound with healthy granulation; split thickness skin grafting was planned. *Vrana Dhavana* was done with sterile lukewarm *Triphala Kwath* for about 20 minutes. During daily dressing, loose slough was removed (*Lekhana Karma*) by dry gauze and scissors.

Material used for *Jalaukavacharan* was *nirvish jalauka*, *haridra churna*, sterilized gauze pieces, dressing pads, kidney tray, sterile cotton, normal saline, sterile gloves, needle, container of water (to keep the *Jalauka* after the procedure) which will be labelled with patient's name with date.

Procedure of *Jalaukavacharan*¹⁶:

1. *Purva karma*:

Jalauka were prepared for procedure of *Raktamokshan* as follows: 4 to 5 *Jalauka* of moderate size were kept in *Haridra jala*. Wound was cleaned with normal saline to remove any discharge or slough.

2. *Pradhan karma*:

3 to 4 *Jalauka* were kept over wound site. *Jalauka* started sucking blood well. Wet cotton kept over them.

3. *Paschat karma*:

Jalauka fall itself after sucking of impure blood. For haemostasis *Haridra Churna* was applied over sucked site. Pressure bandage was given.

For *Jalauka*: *Jalauka* were kept in *haridra jal* for proper *vaman* of sucked blood. When *Jalauka* become active it is then kept in container filled with water. This procedure was done until the healthy granulation of wound for next 20 days. *Vrana Dhavana* with *Trifala Kwath* was continued. On 20th day all *Shuddha Vrana Lakshanas*¹⁷ were seen i.e.

wound was covered with healthy granulation, discharge was absent, smooth edges and absence of pain. Next day split thickness skin grafting was planned.

Procedure Of Skin Grafting:

Pre-operative procedure was done by keeping the patient Nil By Mouth for 6 hrs before surgery, for antibiotic coverage Injection ceftriaxone 1gm intravenously given before operative procedure, informed and written consent of the patient was taken and Part preparation and scrubbing of wound was done. Next morning the patient was taken for Operative procedure. Under all aseptic precaution, under spinal anaesthesia, Parts painted, draped and isolated. Wound at left leg was scooped for fresh bleeding and edges were refreshed, then split skin graft was taken from patient's antero-lateral aspect of thigh. Graft was immersed in normal saline and multiple stab incisions were given over graft to avoid stagnation of blood and for proper aeration of wound. Then graft was applied over wound site and proper approximation was done by using skin stapler. Wound was dressed. Post-operatively the antibiotic coverage was continued for further 3 days to prevent infection to wound site along with Analgesic and Anti-inflammatory drugs, Immobilisation and strict Limb elevation was advised.

Observations:

After 5 days, dressing was removed and it is noted that 95% of graft was accepted. On next follow up of 10th day, new epithelialisation was formed where the graft was accepted. All skin staplers were removed. Wound got totally cured by above plan of treatment and post-operative care and aseptic precautions and about 95% graft was accepted.

Wound healing and granulation tissue formation was assessed by following criteria:

Subjective criteria:¹⁸

Table No. 3: Subjective Criteria

1. Pain: Pain was assessed by visual analogue scale.		2. Itching (kandu):	
No Pain	Moderate Pain	No itching	0
		Itching sometimes a day	1
		Itching whole day without disturbing sleep	2
		Severe itching disturbing sleep	3

Objective Criteria:

Table No. 4: Objective Criteria

1) *Vranatala (Wound bed)*:

Smooth, irregular, healthy granulation	0
Smooth, irregular, slight discharge, less granulation	1
Rough, irregular, wet, more discharge, slough	2
Rough, irregular, profuse discharge, more slough	3

2) *Gandha (odour)*

No smell	0
Bad smell	1
Tolerable unpleasant	2
Foul smell, intolerable	3

3) *Strava (Discharge)*

Slightly moist gauze	0
Sero purulent discharge	1
Serosanguinous discharge	2
Serous discharge	3

4) *Varna (Granulation tissue formation)*

Pinkish red	0
Slight pinkish red	1
Slight yellowish	2
Yellowish	3

Observation:

Daily *Jalaukavacharan* was then started and observed for further improvement in discharge, odour, pain, granulation tissue and size and observations were noted as follows:

Table No. 5: Observations

SR. no	Variables	Before treatment	5 th day	10 th day	15 th day	20 th day
1	Pain	5	3	2	1	1
2	Itching	3	2	1	0	0
3	Vranatala	3	2	1	1	0
4	Gandha	3	2	2	0	0
5	Strava	3	2	1	1	0
6	Varna	3	2	1	1	0

Wound was examined after each setting of leech therapy and pinkish granulation tissue was found after 20 settings of leech therapy. Pain was relieved, as per VAS scale it was 3 on the 5th day and on 10th day of treatment it was reduced to 2 i.e slight and bearable pain was there. Itching was reduced and on 20th day it was absent. *Vranatala* was found to be granulated on the 5th day as shown in fig. 2 and on 20th day healthy granulation tissue was observed as shown in fig. 4. After 20 days, there was no foul smell in wound. *Vranastrava* was slight sero purulent on 5th day of *Jalaukavacharan* but on 20th day there was no any discharge. *Varna* was pinkish on day 20th. After 20 days of *Jalaukavacharan*, wound bed was prepared. Wound had a large size so after granulation it was planned to graft the wound. After 2 days, split thickness skin grafting was done under coverage of antibiotics.

DISCUSSION:

In this patient, we observed that he was having chronic wound over leg since last 1 year with sickle cell disease (SS pattern). The occurrence of leg ulceration in sickle cell patient is 8% and 10% between the ages of 10 and 50 years.⁸ He was habituated for long hours standing as a chef for 14 to 16 hours continuously since last 6 years. After an insect-bite he developed ulcer over leg and it remained untreated thus it becomes chronic. Causes of Non-healing ulcer in sickle cell disease involves low oxygen tension, decreased RBC water content, sluggish blood flow, deoxygenated state cause vessel obstruction which increased venous and capillary pressure. Due to longer duration of standing habitats in our patient, venous congestion increases and there is increase in prostaglandins. These factors promote prolongation of inflammatory process; thus, wound does not heal spontaneously causing disruption of further process and hence wound becomes chronic in nature. All above said factors are been invoked as contributing factors. Proper nutrition and metabolism of blood cells get hampered. Local Ischaemia causes secondary bacterial infection. Local wound care is very important part in these cases.

Jalaukavacharan is a biological intervention where leech suck blood by attaching human body. During blood sucking the salivary secretions of the leech get introduced in human body. Salivary gland of *Jalauka* contains more than 100 bioactive substances¹⁹ like Hirudin, Hyaluronidase, Bdelins, Anaesthetic-like substances and histamine like substances etc. and overall it has anti oedematous, bacteriostatic, analgesic effects. It eliminates microcirculation disorders, eliminates hypoxia, restores damaged vascular permeability of tissue and organs.²⁰ Individual action of some contents of saliva in leeches are as follows, Hirudin which acts as potent anti-coagulant and vasodilator, Hyaluronidase facilitates penetration and diffusion of pharmacologically active substances into the tissue, Bdelins have anti-inflammatory effects and inhibit trypsin, plasmin, Anaesthetic-like substance reduce pain during biting by a leech, Histamine-like substances increases inflow of blood at bite site, Complement inhibitors replace natural complement inhibitors if they are deficient and Acetylcholine acts as a vasodilator.²¹ Platelet activating factor antagonist (PAFA) is more effective antithrombotic than Heparin. Collagenase enzyme splits collagen chain and collagen involves platelet aggregation.²² Use of leeches is useful in non-healing ulcers as the secretions enhance the microcirculation of the blood in wound site and from surrounding thus flushing out all metabolic waste, impure blood and toxins. This process enables to increase in perfusion of fresh oxygenated and pure blood at wound and it triggers wound healing by proliferation and formation of healthy granulation tissue.

In many case studies on NHU application of leech (*Jalaukavacharan*) locally showed formation of healthy granulation tissue which is required for wound bed preparation and it also enhances split skin graft uptake.²³ Leeches are advocated in the wound having hard swelling, infected wound, painful and large wounds by *Acharya Sushruta* in the context of *Vrana Shashthi Upakrama*²⁴. In areas of significant tissue loss, after preparation of wound bed, split thickness skin grafting will speed up formation of an intact epithelial barrier to fluid loss and infection. Split thickness skin grafting is the current gold standard for

the treatment of major traumatic loss of skin. Use of split thickness skin graft provides regeneration of epidermis and diminishes wound contraction. The patient treated with leech therapy, *Ayurvedic* medicines like *Triphala Guggul*, *Amruta Guggul* have effects like *Dosha pachana*, *Ropana*, *Vedana shamana* and had yielded better outcome with more percentages of relief in odour, pain and discharge. It had a comprehensive therapeutic influence in promoting wound bed preparation by healthy granulation tissue²⁵. Because of debridement all debris were removed while because of *Jalaukavacharan*, inflammatory mediators and chronic inflammation reduces causing new vascularisation and new healthy granulation of wound thus facilitating graft acceptance.

CONCLUSION:

Jalaukavacharan is an ancient *Ayurvedic* technique which having immense potential to treat inflammatory, ischaemic and chronic conditions. In the patient of sickle cell disease (SS pattern) with chronic non-healing ulcer, along with internal medicines like *Triphala* and *Amruta Guggul*, *Triphala Kwath Dhawan* and application of *Jalauka* at wound site eliminates all vitiated *Doshas*, purifies impure blood and increases microcirculation to wound thus facilitated healthy granulation tissue formation which increases the uptake of split thickness skin graft.

Figure 1

Initial presentation of NHU during jalaukavacharan on 1st day.



Figure 2

Lateral aspect of NHU



Figure 3

During Jalaukavacharan



Figure 4

Wound bed prepared after 20 leech setting on 20th day



After Skin Grafting:**REFERENCES**

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