IJBPAS, January, Special Issue 2, 2022, 11(1): 358-366
ISSN: 2277–4998

International Journal of Biology, Pharmacy and Allied Sciences (IJBPAS)
'A Bridge Between Laboratory and Reader'

www.ijbpas.com

HEALING OF A CHRONIC ISCHAEMIC ULCER THROUGH LEECH THERAPY: A CASE STUDY

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Received 15th June 2021; Revised 10th July 2021; Accepted 24th Aug. 2021; Available online 25th Jan. 2022

https://doi.org/10.31032/ijbpas/2022/11.1.2033

ABSTRACT

Non- healing ulcers or chronic ulcers have always been a big challenge for surgeons and clinicians irrespective of their origin and are often difficult to treat. In spite of ever advancing medical system, many of the ulcers fail to heal and it remains to be a financial, physical and emotional problem for the patients that hamper their daily life routines. The present study was taken with the aim to provide a concrete solution to this problem. A case of a non-healing ischaemic ulcer of lower limb was managed effectively by use of Medicinal Leech Therapy (*Jalaukavcharan*) in lines with the principles of Ayurveda. Medicinal leech therapy (*Jalaukavcharan*) was used on a weekly basis in a 74 years female patient suffering from chronic ischaemic leg ulcer which did not respond to the conventional treatment for more than six months. The ulcer responded well to the leech therapy and the healing was achieved in around one and a half month. The leech therapy proved to be an economical, safe, painless and time saving treatment for chronic leg ulcer of arterial origin. This study provides a ray of hope to the sufferers and can pave the way for newer horizons in management of non-healing ulcers.

Keywords- Chronic ulcer, Non-healing ulcer, Medicinal leech therapy (MLT), *Jalaukavcharan*, Ayurveda, Wound healing

INTRODUCTION

Non- healing ulcers are defined as traumatic or spontaneous lesions more common in lower extremities which do not respond to initial therapy or that persist despite appropriate care and do not show signs of healing in a defined time period. They have an underlying aetiology which may be related to local disorders or some systemic disease [1]. The ulcers are regarded as chronic if they do not heal for more than 6 months [2]. They are commonly formed due to peripheral neuropathy, ischemia or trauma [3]. The usual conventional treatment includes antiseptic dressings, proper debridement, infection- control, improving blood supply to the ischaemic tissue and prevention from undue pressure. In some non-responding cases advanced treatments are used like Platelet rich plasma (PRP), skin grafting etc. [4]. Many of the ulcers still fail to respond to the conventional treatments and it is a persisting concern at physical, emotional and financial level for the sufferers. It jeopardizes the daily routines of patients and troubles them for a long time. Arterial ulcers are rare in comparison to venous ones. They occur due to peripheral vascular disease and poor peripheral circulation. They are commonly found in elder people and resultant of trauma and infection of unhealthy skin over the limited area of lower leg and foot [5]. 20% of people with leg ulcers have arterial disease with or without venous disorder. Prevalence of active leg ulcers is between 1.5 and 3 in 1000 people which further increases to about 20 in 1000 in people over 80 years of age [6].

In Ayurveda, the chronic wounds are categorized under *Dushtavrana* (means which are difficult to heal) [7] [8]. The wounds or ulcers found in elders or weak people are difficult to treat [9]. The present case fits into the category of non-healing ulcer and age of patient further renders it difficult to treat. Blood-letting has been advocated in management guidelines of *dushtavrana* as per Ayurveda principles [10]. *Jalaukavcharan* or Leech application has been labelled as the safest method to let the blood out in females and elderly patients [11]. Therefore this treatment was chosen in this case.

CASE DETAILS

A female patient aged 73 years came to the OPD with complaints of ulcer over the lateral malleolus right leg present from last 6 months and mild swelling. Patient had history of mosquito bite and when she itched over the lesion, it converted into an ulcer, progressed to a bigger size over a period of time with pain and discharge. The wound was approximately 15>< 10 cm on

anterolateral aspect of lower leg just above the lateral malleolus. Patient got treatment from many centres but wound did not improve much. Patient was non-diabetic and had a medical and surgical history of Rheumatoid arthritis for few years and PTCA (percutaneous transluminal coronary angioplasty) was done for coronary artery disease in 2015. On vascular examination right sided femoral and popliteal arteries were palpable but posterior tibial and dorsal pedis arteries were not palpable. On left side also posterior tibial, dorsal pedis arteries were not palpable. Colour Doppler showed moderately compromised blood supply and CT angiography has shown reduced lumen/ stenosis in right renal artery (90%), left internal iliac artery (60%), left superficial femoral artery (50-60%), B/L posterior tibial (90-95%) and anterior tibial and peroneal arteries of left side (90-95%). Patient also had a small ulcer on the medial side previously which got healed after treatment. She was diagnosed with Pyoderma gangrenous by a rheumatologist and was also suggested to go for skin grafting. But due to dubious prognosis explained by the plastic surgeon she did not opt for grafting. Afterwards the patient came to us and was put on intermittent Leech therapy (*Jalaukavcharan*) at once a week frequency after proper debridement of wound. The dimensions of wound were 11*8 centi-meters. Patient was advised to keep the wound clean and do daily antiseptic dressings as it was being done earlier at home. The healthy granulation tissue started to emerge and healing started gradually. The wound began to improve significantly. Slowly the discharge was reduced and wound healed completely just after 5 sittings of leech therapy. Proper epithelialisation was achieved.

Table 1: Timeline for the Progression of disease and treatment history

DATE	NOTABLE EVENTS
1. June 2019	Mosquito bite and itching → dermatitis – wound formation (increased gradually)
2. 4-10-2019	Diagnosed having ulcer associated with dermatitis and oedema (at a private clinic)
3. 12-11-2019	Referred to plastic surgeon by private nursing home
4. 26-11-2019	Colour Doppler showed moderately compromised arterial blood flow in bilateral lower limbs and severely compromised in posterior tibial artery
5. 5-12-2019	Pyoderma Gangrenous was diagnosed by the rheumatologist and patient was put on steroids
6. 6-12-2019	CECT Peripheral angiography was done along with venous colour Doppler for lower limbs
7. 26-12-2019	Dimensions of wound were recorded as 15*10 cms antero-laterally.

Table 2: *Ayurvedic* Treatment Timeline

DATE	EVENTS
12-2-2020	Initial assessment and cleaning of wound.
17-2-2020	Leech therapy was started (first sitting was done).
24-2-2020	Wound size regressed, discharge and pain reduced and margins were dried. Second sitting was done.
. 2-3-2020	Further reduction in wound size and wound healing +. Pain reduced significantly. Discharge was mild. Third sitting of leech therapy.
. 9-3-2020	Discharge insignificant, oedema reduced, discolouration was reduced. Fourth sitting done.
16-3-2020	Healthy granulation with epithelialization, no discharge, significant reduction in wound size. Fifth sitting was done.
25-3-2020	Wound completely healed.

PRE TREATMENT

LEECH Application

Post Treatment

DISCUSSION-

The arterial ulcers of the lower limbs account for 20% of the total leg ulcers and are around 1/5th in comparison to venous ulcers. They are commonly found in elderly people and patients having peripheral vascular diseases. Resultant ischemia is the main cause of ulcer formation, vulnerability to infections and non-healing nature of ulcer. Any chronic ulcer is difficult to treat as it is non-responding to the usual treatment and natural healing process does not take place or remains very limited. In this study, one such chronic ulcer of ischaemic cause and of arterial origin was treated with use of intermittent leech therapy. Application of leeches which is also known as *Jalaukavcharan* or Hirudotherapy or Medicinal Leech therapy (MLT) dates back to 1500 B.C, almost 3500 years ago [12]. *Jalaukavcharan* is a popular method of treating vascular disorders in Ayurveda. MLT is a multi-faceted approach with a wide therapeutic sphere. Its therapeutic actions include- increasing the blood influx to the bite site, pain reduction, lymph flow stimulation, anti-inflammation, anti-coagulation, anti-microbial effects and is a potent wound healer [13]. The therapeutic effects of leeches are achieved as a result of various proteins and bioactive molecules available in leech secretions, following a bite. The secretions help to eliminate microcirculatory disorders, re-establish oxygenation and eliminate hypoxia by restoring the permeability of vessels supplying the tissues, decrease blood pressure, improve activity of immune system and also improve the overall bioenergetics status of the individual [14].The leech secretions have shown to have more than 100 types of proteins, out of which only a few perform the major role [15].

Table 3- The Healing Peptides in Leeches and Their Actions [16] [17]

S.no.	Components (Bioactive substances)	Function
1.	Hirudin	Inhibits blood coagulation by binding to thrombin.
2	Calin	Inhibits blood coagulation by blocking the binding of von willebrand factor to collagen. Inhibits collagen mediated platelet aggregation.
3	Destabilase	Monomerizing activity, dissolves fibrin, thrombolytic effects.
4	Hirustasin	Inhibits kallikrein, trypsin, chymotrypsin neutropholic cathepsin G
5	Bdellins	Anti- inflammatory, Inhibits trypsin,plasmin, acrosin.
6	Hyaluronidase	Increases interstitial viscosity, antibiotic.
7	Tryptase	inhibitor Inhibits proteolytic enzymes of host mast cells
8	Eglins	Anti-inflammatory, inhibit the activity of alpha- chymotrypsin, chymase, substilisin, elastase, cathepsin G
9	Factor Xa inhibitor	Inhibits the activity of coagulation factor Xa by forming equimolar complexes
10	Complement inhibitors	May possibly replace natural complement inhibitors if they are deficient
11	Carboxydase A inhibitors	Increase the inflow of blood at the bite site
12	Histamine like substances	Vasodilator. Increases the inflow of blood at the bite site
13	Acetylcholine	Vasodilator
14	Anaesthetic substances	Anaesthetic
15	Apyrase	Inhibits platelet aggregation
16	Anti-stasin	It serves as a potent factor Xa inhibitor and has an inhibitory effect on the kinin–kallikrein system.

MLT was previously tested and is widely used after plastic, reconstructive and microsurgical applications and in chronic wound managements along with other various kinds of disorders. Studies have shown beneficial effects in venous ulcers, diabetic foot ulcers, post- traumatic wounds, buerger's disease and cutaneous leishmaniasis [18]. In the present study gross improvement in colour of surrounding skin and reduction in local swelling and discharge from wound was observed. The size of ulcer regressed in a short time considering the history and age of patient. These benefits were probably achieved by improvement in local blood circulation and better nutrition to the surrounding tissues. Better oxygenation aided the healing process and regression of associated symptoms like pain, oedema and discolouration. The bio-peptides in the leech secretions are considered as the reason for better oxygenation achieved by vasodilation and improving micro-circulation, anti-inflammatory effects and important anti-microbial activities. The anti-microbial activity helped in reduction of local infection and discharge and further enhanced the healthy granulation. The earlier pharmacological studies done on various animals like rats, mice, rabbits and pigs have investigated the effects of leech application on ischemia. These studies demonstrated that the blood flow viscosity is reduced, microcirculation is improved and anastomosis is accelerated by application of leeches [19] [20]. Another study on rats found the effects like reduction in local necrosis and inflammation, faster epithelialization and granulation, enhanced macrophages activity and neo-angiogenesis and increase in lymphatic vessels. [21] All these findings further strengthen the findings of present case.

CONCLUSION

Medicinal leech therapy used on weekly basis resulted in completed healing of an ischemic wound in the elderly female patient. The application of leeches improves local circulation, enhances nutrition and oxygenation to tissues, have anti-microbial, anti-inflammatory and analgesic effect. It is an economical, minimal invasive, pain free and time-saving option in chronic ulcers and thus can prove to be an alternative to conventional methods especially in the poor patients having limited access to sophisticated treatments and patients residing in remote or underdeveloped areas.

Acknowledgement

Vaidya Akshay Chauhan, Chauhan Ayurveda Hospital, Noida, U.P, India

REFERENCES

[1] Greer N, Foman N, Dorrian J, *et al*. Advanced wound care therapies for non- healing diabetic, venous and arterial ulcers: a systemic review. 2012. [Google Scholar]

[2] Maĭorov VM. Dlitel'no ne zazhivaiushchie iazvy zheludka [Chronic non-healing stomach ulcers]. Ter Arkh. 1985; 57(2):43-7. Russian. PMID: 4002134.

[3] Crawford F, Inkster M, Kleijnen J, Fahey T. Predicting foot ulcers in patients with diabetes: a systemic review and meta-analysis. QJM. 2007;100(2): 65-86. Doi:10.1093/qjmed/hcl140. [Pubmed][crossref]

[4] Suthar Manish, Gupta Saniya, Bukhari Suhail, Ponemon Venkatesh. J Biomed Sci. 2017;24:16. doi:10.1186/s12929-017-0324-1 PMCID: PMC5327512 PMID:28241824

[5] Das Somen, A Manual On Clinical Surgery, 5th edition, SD Publisher, Calcutta, 2000, chapter 4, page 51-54.

[6] Nelson EA, Adderley U. Venous leg ulcers. BMJ Clin Evid. 2016 Jan 15;2016:1902. PMID: 26771825; PMCID: PMC4714578.

[7] Shastri A. Susruta Samhita, Edition 2017. Chaukhambha Sanskrit Sansthan: Varanasi. Sutrasthan Chapter 22, Verse 7, page 123.

[8] Trikamji J. Charak Samhita, Edition 2014. Chaukhambha Sanskrit Sansthan: Varanasi. Chikitsasthana, Chapter 25, verse 26, page 493.

[9] Shastri A. Susruta Samhita, Edition 2017. Chaukhambha Sanskrit Sansthan: Varanasi. Sutrasthan Chapter 23, Verse 4, page 126.

[10] Shastri A. kaviraj. Susruta Samhita, Edition (reprint) 2021, volume 1. Chaukhambha Sanskrit Sansthan: Varanasi. Chikitsasthan Chapter 2, Verse 86-88, page 26.

[11] Shastri A. Susruta Samhita, Edition 2017. Chaukhambha Sanskrit Sansthan: Varanasi. Sutrasthan Chapter 14, Verse 3-4, page 61-63.

[12] Stawicki S, Porshinsky B, Saha S, et al. Clinical uses of the medicinal leech: a practical review. J Postgrad Med. 2011; 57(1):65.

[13] Hildebrandt JP, Lemke S. Small bite, large impact e saliva and salivary molecules in the medicinal leech, Hirudo medicinalis. Naturwissenschaften. 2011; 98: 995-1008.

[14] Godekmerdan A, Arusan S, Bayar B, Saglam N. Medicinal leeches and hirudotherapy. Turkiye Parazitol Derg. 2011; 35(4):234-239.

[15] Edwin L. Cooper, Natalie Mologne. Exploiting leech saliva to treat osteoarthritis: A provocative perspective. Journal of traditional and complementary medicine 7(2017): 367-369. http://dx.doi.org/10.1016/j.jtcme.2016.11.005

[16] Phull Gaurav et al. Effect of Leech Therapy In Diabetic Foot Ulcer A Case Study. IJAAR VOLUME II ISSUE 5 JAN-FEB 2016.

[17] Amarprakash p. Dwivedi. Case study of leech application in diabetic foot ulcer. Int. J. Res. Ayur. Pharm.2012;3(5): 748-751.

[18] Detlev Koeppen a, Michael Aurich, Mehdi Pasalar, Thomas Rampp. Medicinal leech therapy in venous congestion and various ulcer forms: Perspectives of Western, Persian and Indian medicine. Journal of Traditional and Complementary Medicine; 10(2020): 104-109.

[19] Whitaker IS, Oboumarzouk O, Rozen WM, et al. The efficacy of medicinal leeches in plastic and reconstructive surgery: a systematic review of 277 reported clinical cases. Microsurgery. 2012; 32:240-250.

[20] Herlin C, Bertheuil N, Bekara F, et al. Leech therapy in flap salvage: systematic review and practical recommendations. Ann Chir Plast Esthetique. 2017; 2(2): 1-13.

[21] Gilyova OS, Korobeinikova GA, Gibadullina NB. Experimental studies on the healing and anti-inflammatory effects of leeching. Int Biother Soc. 2007;1.