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# Sushruta's eight pearls for Infective Ulcer

Sathish HS,<sup>1</sup> Rashmi TM,<sup>2</sup> Thirunavukkarasu MS,<sup>3</sup> Mithun B,<sup>4</sup> Narmada MG.<sup>5</sup>

<sup>1</sup>Associate Professor, <sup>2</sup>Assistant Professor, Indian Institute of Ayurveda Research and Hospital, Rajkot, <sup>3</sup>Associate Professor, Govt. Ayurvedic Medical College, Nagercoil, Tamilnadu, <sup>4</sup>Associate Professor, Dhanvantari Ayurveda Medical College, Koydam, Gujarat, <sup>5</sup>Professor, Govt. Ayurvedic Medical College, Bangalore, Karnataka, India.

## ABSTRACT

A detailed review of ancient texts of Ayurveda connotes tremendous information on wound healing potentials of herbs being utilized by their different forms. This brings curiosity to learn more about the creative applications of herbs in various types of wounds. Probably this could be one among the several reasons which honors *Sushruta*, an Ancient Indian Surgeon as Father of Surgery. Wound dressing in various systems were compared not only on the basis of the rate of granulation tissue formed or the rate of wound healing but, also on the cost and duration of hospital stay of the patient which was considered as a measure of the morbidity of the patient. As per Ayurvedic texts, Wounds, Ulcers, Burns and Incision all are grouped under one term as '*Vrana*', a defect in skin or mucous membrane being common in all of them. On the basis of stages of pathogenesis *Vrana* or ulcer has been divided as *Dushta Vrana* (Chronic / non healing / infected ulcer), *Shuddhavrana* (healthy wound), *Ruhyamana Vrana* (Healing wound) and *Rudha Vrana* (completely healed wound). *Sushruta* indicates eight pearls for Infective ulcer, these eight being the eight forms of medical therapeutics used locally to cleanse the ulcer and bring to healthy state.

**Key words:** *Vrana, Dushtavrana, Shuddhavrana.*

## INTRODUCTION

Ancient Indian surgical science offer detailed descriptions of ulcer, its pathogenesis, diagnosis and its management. Detailed, systematic, scientific information can be traced in the text "*Sushruta Samhita*". As surgery revolves around art of healing, our ancient Indian Surgeon, *Sushruta* mastered this technique and quoted many verses under various headings of ulcer. Sixty remedial measures are designated for management of Pathological wounds.<sup>[1]</sup> Among those sixty varied forms, 8 forms

are meant especially for cleansing the wound and to fetch healthy state to wound. These eight forms are considered as eight pearls for all non healing, chronic pathological and infective ulcers.

Infective ulcer, in Ayurvedic terminology, *Dushta Vrana* is an ulcer which has bad odour, has an abnormal color with profuse discharge, intense pain and takes longer period to heal. The features of *Dushta Vrana* (Infective Ulcer) will vary according to the predominant *Dosha* (Morbid factor) in it. *Dushta Vrana* comprises of chronic wound, non-healing wound and infected ulcers.

This article is confined to forms of dressing advocated by *Sushruta* for converting an infected wound to healthy wound state. *Shodhana* and *Ropana* are two important elements of local wound management.<sup>[2],[3]</sup>

***Shodhana***<sup>[4]</sup> A measure / therapy in which certain forms of drugs are employed to cleanse the *Vrana/ulcer*, where in the infected wound is transformed into a healthy state.<sup>[5],[6]</sup> The term, *Shodhana* refers to cleansing, so the drugs used for this purpose must possess properties which does

### Address for correspondence:

**Dr. Sathish HS**

Associate Professor, Indian Institute of Ayurveda Research and Hospital, Rajkot, Gujarat, India.

E-mail: ayursathishhs@gmail.com

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nullify microbial load in an ulcer, reduces exudation, removes foul odour, eliminate the pathological causes locally.<sup>[7],[8],[9]</sup>

*Ropana*, are the various modalities employed to completely heal a healthy wound.

Though *Sushruta* advocates 60 special measures for treating an ulcer,<sup>[10]</sup> this article is aimed at *Shodhana* modalities.

To heal the ulcer, management can be grouped as systemic management and the other, Local management. Systemic management of ulcer varies according to the pathology involved in it. Number of purificatory therapies, several internal medicines supplemented with proper daily regimen will help in correcting the defect. While in local management, it can be grouped under purificatory / (*Shodhana*) and healing (*Ropana*). Once the ulcer is healthy from an infected state, it heals by natural intention or in some cases needs some medicinal help like wound healing drugs. Proper wound care is utmost necessity for healing the wound.<sup>[11]</sup>

The eight pearls or forms of medication<sup>[12]</sup> are *Kashaya* (Medicated decoction), *Varti* (Wound plug or lint), *Kalka* (Medicinal paste), *Sarpi* (Medicated ghee), *Taila* (Medicated oil), *Rasakriya* (Medicated aqueous extract), *Avachurna* (Medicated powders) and lastly *Dhupana* (Wound fumigation). These forms are utilized in enabling a wound to attain healthy and healing stage from infective state. Eight forms of local wound management by using drugs having moisture absorbing, cleansing, debriding, analgesic, anti inflammatory, antimicrobial and important one, wound healing properties cleanses the infective ulcer and thereby promotes healing.

**Table 1: Depicting the forms of dressing**

S N	Form of Preparation	Modern correlation	Mode of Usage	Number of Research Studies reported [13]
1	<i>Kashaya</i>	Medicated Decoction	Pouring method	04

2	<i>Varti</i>	Suppository /Lint/Plugs	Plugging or insertion into the track	08
3	<i>Kalka</i>	Paste form	Topical application	12
4	<i>Sarpi</i>	Medicated Ghee	Wound Irrigation And topical application	34
5	<i>Taila</i>	Medicated Oils	Wound Irrigation And topical application	48
6	<i>Rasakriya</i>	Aqueous extract	Topical application	01
7	<i>Avachurna</i>	Powder formulations	Topical application	08
8	<i>Dhoopana</i>	Fumigation	Wound Fumigation	02

**Table 2: Depicting the characteristics of dressing forms**

Dressing Form	Function	Indication	Contra - indications	Remarks
<i>Kashaya</i>	Aid to remove the non viable tissue mechanically. Pain relieving, Serves achieving wound hygiene.	An indurated, painful, fetid, moist and slimy ulcer	Wounds with minute openings like sinus and crush wounds with more depth.	Inability to remove necrosed or devitalized tissue completely. <b>Short residence time on the wound site</b>
<i>Varti</i>	Aid to remove the debris, hair etc	An ulcer associated with any foreign	Cannot be used in wide mouthed ulcers	<i>Varti</i> itself may act as a foreign body. Chances of

	residing in a sinus Microbial load of the track is checked. Healing from the base is stimulated and monitors the healing from the base.	matter (e.g.,pus) lying embedded in it, or a sinus		breaking of varti inside tortuous or irregular sinus tracks
<b>Kalka</b>	Helps in removing the unhealthy tissue by virtue of autolytic debridement. Assist in creating wound hygiene.	An ulcer full of putrefied flesh and marked by the action of the highly deranged <i>Doshas</i> (humour such as <i>Vata</i> and <i>Kapha</i> )	Should not be applied on burnt wound or suppurating wound as it may aggravate the suppuration process. Should not be used in deeper afflictions or deeper wounds	Widely practiced form of dressing employed mainly by traditional and complementary systems of medicine
<b>Sarpi</b>	Facilitates the debridement and destroys the	An ulcer of Pittaja origin, which is deep seated	Not advocated for increasingly exuding	In excess, increase wound moisture level

	microbes, relieves the pain especially burning sensation	and attended with a burning sensation and suppuration.	wounds	
<b>Taila</b>	Cleanses, debrides the infective ulcer. Corrects the local pathological defect	An ulcer with raised flesh, and which is dry and is attended with scanty discharge	No specific contraindication. Should not be used over burn and scalds	Very widely practiced potent form.
<b>Rasakriya</b>	Superior form for cleansing wounds those which are not cleansed by medicated oil and ghees	An indurated ulcer, refusing to get purified by application of any of the above forms like Kashaya, varti, Kalka, Sarpi, Taila	Not preferred for deeper wounds	This form is less practiced. Only negligible research studies on the topic
<b>Avachurnana</b>	Cleanses the superficial ulcer	Superficial and foul smelling ulcers covered with layers of derange	Should not be used in deeper wounds	Helps in cleansing the superficial wounds. Particles of churna itself may

		d fat.		act as foreign body.
<b>Dhoopana</b>	Best method for both forms of infective ulcer either superficial or deep. Potent analgesic Dries up the excessive moisture Destroys the all microbes	Vataja Wounds – especially with severe pain, high exudation	No specific contraindications	Potent analgesia is produced. Compared to other forms it relieves pain instantly and significantly

#### **Kashaya [Medicated decoction]<sup>[14]</sup>**

It is obtained by boiling the coarsely powdered plant material in required quantity of water till the active ingredients are extracted completely in the water.<sup>[15]</sup> The retained liquid after boiling is filtered through a muslin cloth, which is termed as 'Kashaya'. By boiling the plant material in water, water soluble and heat stable ingredients are extracted.<sup>[16],[17],[18]</sup>

After the dressing is removed, the prepared *Kashaya* is poured from a suitable height in continuous flow for a period of ten to fifteen minutes. This method removes the dirt, slough and cleanses the wound. This method can be compared to modern irrigation<sup>[19]</sup> method.<sup>[20]</sup> Pouring of warm decoction is specified in infective ulcers whereas in acute wounds or burns, decoction may be either cold or warm depending on the wound attributes. The irrigation of decoction acts as mechanical debridement as it washes away the exudates, slough and dirt from the ulcer with minimal mechanical trauma. It also helps in relieving pain and swelling. Its proven management which increases circulation and permeability by tactile stimulation and histamine release; resulting in absorption of drug and

local nourishment of the affected part.<sup>[21]</sup> Pulsed lavage, a modern method is found to be quite efficient in removing bacteria in a wound.<sup>[22]</sup> The application of warmth directly to chronic wounds and also post operative wounds has shown to aid healing and reduce pain.<sup>[23]</sup>

**Indications:** An indurated, painful, fetid, moist and slimy ulcer should be washed with a disinfectant or purifying lotion consisting of a decoction of the drugs.

#### **Limitations**

In conditions like, Open fracture wounds, sinuses, a wound having more depth, this modality is not advised amid fear of infection and increase in moisture level. Inability to remove necrosed or devitalized tissue completely, as it needs surgical or other form of debridement.

Short residence time on the wound site, especially in exuding wounds.<sup>[24]</sup>

#### **Advantages and Rationale**

- This form of wound wash by using decoctions are practiced in several folklore, tribal and traditional practices of medicine.
- Mechanical debridement of the wound.<sup>[25]</sup>
- Hydrates the non healing dry wound.
- Removes the superficial and deeper debris.
- Stimulates the local blood supply and improves the venous drainage.<sup>[26]</sup>
- Analgesia - Due to the temperature and drug potency, the analgesic effect is appreciable.
- Topical drug delivery - Results in correcting the local pathological incident and improves the wound environment.
- Improves the patient comfort during dressing.

#### **Varti [Medicated Lint/Plug]<sup>[27]</sup>**

- A Suppository / lint / plug prepared out of medicated herbs.
- These plugs cause debridement of slough, debris and drains it out in pus form along with embedded hair or other foreign matter.

**Indications<sup>[28]</sup>**

Plugs or Lints plastered with paste of the purifying drugs should be inserted into an ulcer associated with any foreign matter (e.g., pus) lying embedded in it, or into one with a sinus opening, or into one covered by slough. These plugs cause debridement of slough, debris and facilitate in draining of pus along with the embedded hair or other foreign matter and thereby cleansing the tract. Debris, collected pus, interpose a barrier between two surfaces which cannot grow together until such material has been removed and once the tract is cleansed healing may take place.

**Limitations**

This modality is limited to sinuses and fistulas only, as the form is specified for it.

**Advantages and Rationale**

- Best method for sinuses and fistula
- Several studies denoted significant results in healing of the track.<sup>[29]</sup>
- Inoperable cases of sinus or fistula are also best managed by *Varti* method.
- Aids in extraction of foreign body in sinus tracks.
- Due to longer residence on the wound, it facilitates the debridement of unhealthy tissue in the track surface and also drug delivery into the tissue.
- Researches on standardization of the method are the need of the hour.

**Kalka [Medicated Pastes]**

*Lepa*, is a therapy wherein external application of medicinal paste is done over afflicted part.

They are mainly of 3 varieties, viz., *Aalepa*, *Pradeha* and *Pralepa*. The one which is used for ulcer is known as *Kalka*. In this paste prepared out of herbs is used.<sup>[30]</sup>

It can be prepared with wet drugs or dry drugs. It is prepared by mixing the fine powder of herbs mixed with required quantity of water. The prepared

product should not be too dilute or nor too hard. It is also prepared adding some quantity of oil.

**Indications**

An ulcer full of putrefied flesh and marked by the action of the highly deranged *Doshas* (humour such as *Vata* and *Kapha*) should be purified with a paste of purificatory drugs.<sup>[31]</sup>

The *Kalka* to be applied on the ulcer in the morning and removed after few hours, as it's contraindicated to be kept in the night hours.<sup>[32]</sup> The consistency of the paste should be neither too thin nor too thick, as too diluted form will increase exudates in the ulcer and too hard will result in injury to base of the ulcer and during removal, pain will be more.

*Sushruta* emphasized about its pain relieving element with an analogy as just like water poured over burning house extinguishes the fire.

**Limitations**

It cannot be used in wound with minute openings such as sinuses, and also in wound with bone depth with fear of contamination if particles of *Kalka* are not removed properly.

**Advantages and Rationale**

- Widely practiced method in traditional and folklore medicinal practices.
- Easiest way among other forms of medication, as preparation time is less.
- High residence time on wound facilitates drug to correct the local pathological events.<sup>[33]</sup>
- For each purpose like debriding, cleansing, healing, moisture reduction, moisture enhancement etc. the choice of herbs are varied.
- It is multifunctional form.
- Studies have shown paste form has significant wound healing potential than the contemporary wound healing practices.<sup>[34]</sup>

**Sarpi [Medicated Ghee]**

It is one of the commonest Ayurvedic preparation used both internally and externally. *Ghrita/Sarpi*

possesses *Samskaranuvartana* property, it retains its innate qualities along with the qualities of drugs with which it is processed (Su.Su.45/11), this was affirmed by the recent researches that when herbs are mixed with ghee, their activity and utility is potentiated.

Ghee is a rich source of essential fatty acids (EFAs), which regulate prostaglandin synthesis and hence induce wound healing. Deficiency of EFA results in poor wound healing.<sup>[35]</sup>

#### Indications<sup>[36]</sup>

An ulcer of *Pittaja* origin, which is deep seated and attended with burning sensation and suppuration.

#### Limitations

- It cannot be used in highly exuding wounds.
- Less significant results in chronic, non-healing wounds wherein *Vata dosha* dominance is seen.

#### Advantages and Rationale

- Best form of drug for Acute wounds and burns.<sup>[37],[38],[39],[40]</sup>
- Excellent analgesic effect on all type of wounds and in inflammatory swellings.
- Enhances epithelialisation, angiogenesis and reduces post healed scar size and discolouration.<sup>[41],[42]</sup>
- This ghee form inherits the properties of drugs without altering itself.<sup>[43],[44]</sup>
- Surface covering - In case of burns it covers the surface similar to biological tissue and is soothing to the wound.
- It maintains the optimum moisture level in wound and corrects local doshic imbalance.
- At the cell surface, the lipid soluble drugs penetrates into the cell more rapidly than water soluble drugs and can enter into the circulation very quickly.

#### Taila (Medicated oils)

These are preparations in which oil is boiled with prescribed *Kashayas* (decoction) and *Kalkas* (fine

paste) of drugs according to the formula. This process ensures absorption of the Active therapeutic properties of the ingredients used, into the oil base.<sup>[45]</sup> Majority of medicated oils contain fatty acids which accelerate the epithelial movement and in due course reduces the discharge, promotes epithelization, granulation tissue and avoid hypertrophic scar formation. Medicated oil prepared out of single or multiple herbs having wound healing attributes as suggested in the treatise, has enormous healing potential. Several studies support the fact.<sup>[46]</sup>

**Indications:** An ulcer with raised flesh, and which is dry and is attended with scanty discharge.<sup>[47]</sup>

#### Limitations

- Less significant effects on burn wounds
- Cannot be used in wounds with high exudations - It may increase the moisture levels in the wound bed which is predisposing factor wound contamination.

#### Advantages and Rationale

- Oil is one of the best wound healing media.
- Medicated oil is widely practiced for wound healing purpose. Several studies acknowledge the beneficial effects of medicated oil for infective ulcers.<sup>[48],[49]</sup>
- Oils extracted from plants or animal fats are abundant with fatty acids, for this reason they are preferred to treat burn injuries.<sup>[50]</sup>
- Oil prepared out of medicines listed by Ayurvedic texts cleanses the wound and promotes faster healing of wound.
- Medicated oils serve as a protective agent to the damaged tissues.<sup>[51]</sup>
- Irrigation of wound with oils have proved to produce potent analgesic and anti inflammatory effects.<sup>[52],[53]</sup>
- It increases the collagenation phase of wound healing in chronic non healing wounds like diabetic ulcers, leprotic ulcers and gangrene wounds.<sup>[54]</sup>

- High content of fatty acids in these preparations promotes the healing process.<sup>[55]</sup>
- Promotes wound bed preparation and improves healing rate.<sup>[56]</sup>
- Antibacterial and Antimicrobial – Many of essential and medicated oils clears the infective foci in the wound bed.<sup>[57],[58],[59],[60]</sup>
- Many of the wound healing preparations are using oils as the base media.<sup>[61]</sup>

#### **Rasakriya [Aqueous extract]**

It is a dried aqueous extract.<sup>[62]</sup> It is the solidified mass prepared by evaporating the entire aqueous portion from 'Kashaya'. The water content of the *Kashaya* is evaporated by subjecting it to slow heating. The *Kashaya* passes through various stages as it solidifies from clear liquid to semi-solid and then solid form through the process of heating.<sup>[63],[64]</sup>

#### **Indications<sup>[65]</sup>**

An indurated ulcer, refusing to get purified by application of any of the above forms like *Kashaya*, *Varti*, *Kalka*, *Sarpi*, *Taila* should be dealt with this form of dressing.

#### **Limitations**

No specific limitation.

#### **Advantages and Rationale**

- The wounds which are not cleansed by *Taila* and *Ghrita* formulations gets cleansed by *Rasakriya*, denoting its supremacy over other two forms.
- Potent cleansing and healing agent.<sup>[66],[67]</sup>

#### **Avachurnana [Medicated dusting]**

This form advocates dusting of dry powders of medicated herbs on superficial wounds for cleansing and healing purpose.

#### **Indications<sup>[68]</sup>**

Superficial and foul smelling ulcers covered with layers of deranged fat.

#### **Limitations**

- It is limited to superficial wounds.

- Chances of wound contamination due to fragments of churna or powder

#### **Advantages and Rationale**

One of the finest modality of cleansing and healing superficial infected wounds.<sup>[69],[70],[71]</sup>

Accelerates the healing process.<sup>[72],[73],[74]</sup>

#### **Dhupana [Wound Fumigation]**

*Dhupana* is preventive and curative modality employed in various ailments of the body ranging from minute ear discharge<sup>[75]</sup> to bigger non healing, highly infected wounds.<sup>[76]</sup> These fumigations procedures were known to ancient Indians centuries back and have demonstrated its significance on numerous diseases.<sup>[77],[78],[79],[80]</sup>

#### **Indications<sup>[81],[82]</sup>**

*Vataja* ulcers with severe pain and secretion.

#### **Limitations**

There is no specific limitation of this form except it should be cautiously used in patients having respiratory ailments as co morbidity.

#### **Advantages and Rationale**

- Analgesic - Very potent analgesic form.
- Quick action on microbes<sup>[83]</sup>
- Improves the wound hygiene
- Safe method of wound cleansing
- Reduces post operative pain and improves patient satisfaction.<sup>[84]</sup>
- Accelerates the recovery and rehabilitation
- Used for various Gynecological wounds.<sup>[85],[86]</sup>

#### **DISCUSSION**

In present day, wound dressings are classified as passive, interactive and Bioactive products. The forms of dressing suggested by *Sushruta* are based mainly on type and stage of ulcer. These eight unique forms of wound dressings are specifically employed for *Shodhana* purpose. Functional parameters of Ayurvedic dressings include 1) Provide protection and



conformability to the wound 2) Cleanse the wound by the attributes of the medicaments used, 3) Correct the local pathological event, 4) Promotion of wound healing, 5) Relieves the symptoms like pain, itching, burning etc, 6) Reduce the pain and discomfort during and after the dressing.

To aid the proper selection of dressing form, *Sushruta* has cited specific indications for each form, any ulcer fulfilling such eligibility criteria, such ulcer to be dressed with respective dressing form cited for it. One particular dressing is not to meant to be used for all wound healing stages and situations, the same is been followed the present clinicians.<sup>[87]</sup>

By application of ghee, oil and paste form, a moist wound environment is created. As it has been well documented in contemporary sciences, that moist wound healing prevents the formation of scab as the dressing absorbs wound exudates secreted from the ulcer.<sup>[88],[89]</sup>

Ayurveda always emphasized on using naturally available materials to heal the wound, which is evident by the type of forms used for wound healing. The forms are such of a kind which give the necessary attributes needed for it. Honey based dressings are also suggested by our science, which has been proven in many clinical trials of having bactericidal and bacteriostatic mode of action.<sup>[90]</sup>

The forms of *Sushruta*, stresses maintenance of optimum moist wound environment as it is essential for a wound to heal. Moist wound treatment aids in early and quicker healing.<sup>[91],[92]</sup> Such moist dressings allow endogenous enzymes in the wound fluid to liquefy necrotic tissue selectively.<sup>[93]</sup>

Among these eight forms, *dhoopana* form is relieves the pain instantaneously.

## CONCLUSION

The aim of wound cleansing should be complete removal of all non-viable tissues, enhance wound hygiene and resolve the local pathology, as it is vital for proper wound bed preparation allowing the wound to heal faster. The above said forms corrects the local pathology and stimulates the healing

process. These eight unique forms of wound dressings are truly a Sushruta's contribution to wound science.

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