### HISTORICAL SURVEY OF WOUND HEALING

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#### ABSTRACT

"A constant re-examination of theory of facts is the essence of science."

The response of living tissues to injury forms the foundation of all surgical practices. Indeed, from the historical point of view, tissue injury or *Vrana* or wound and its sequelae have participated in cure of most of the general medical problems from the days of Susruta till date. The earlier medical literatures extensively considered wound care as based on instinctive remedies but on the other hand, the present concepts cogitate healing of wound based on visual observations. Basic perception of wound healing lies only in its interpretation, which has varied from civilizations to civilization. There are various methods for treating of wounds and have since been passed over by ancient humans to today's modern surgeons. Therefore, it is very essential to know the historical aspects of *Vrana* and its *Ropana* since the beginning of the era of medicine as compare to wound and it's healing from the modern point of view. On the basis of above said facts an attempt has been made to explore the historical background of and healing in present paper.

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#### Introduction

Man has always looked well after his own body for achievement of his prime goal i.e. The *Purusartha*. We can assume that, care taken today by the modern surgeons to heal the flesh or to keep—it young. Virile differs little from the attention that primitive man paid to his health and virility. There is no doubt that prehistoric man paid greater attention to—his injuries or wounds.

Art of surgery revolves around *Vrana* and its essence was uneventful healing. The term *Vrana* is derived from *Vrana Gatra Vicurnane* in literal sense a gap or discontinuity of tissues and seems to be most common and earliest among the ailments, man has ever experienced.

The term *Vrana Ropana* depicted here as wound healing, forms the basic theme of the Ayurvedic surgical treatise under the subheadings *Nirukti*, *Sadhyasadhyata* and whole details of *Vrana Ropana* in *Mula*, *Pada*, *Upakrama Adhisthana*, *Laksana* and *Upadrava* are detailed in ancient era. Thus the history of *Vrana* is as old as civilization.

History of medicine can never be complete without quoting the names of three high profile physicians Caraka, Susruta and Vagbhatta. A cursory glance of the obtained ancient medical treatise reveals, that our ancestors had enough thoughts for curing the injured. They had studied the battle wounds and accidental injuries based on the facilities available at their disposal. They evolved suitable remedial measures both in terms of principles of treatments as well medicaments. Treatment of wound, therefore, is an important aspect of health care during that era, as it is even today.

All major entities and commentators of Ayurvedic classics at various places have emphasised to take care of wounds which occurs either as a result of vitiated *Dosas* or due to traumatic origin. The plan for the management of *Vrana* under three subheading *Purva*, *Pradhana* and *Pascata Karma* of different measures by local and general medicaments as well as proper diet. Because of appropriate management in proper time to avoid the conversion of *Sadhya* into *Asadhya* category, the study of *Salya* science brings out very clearly that *Vrana*- wound is the most significant entity on which the whole science of surgery revolves. The very fact that, this subject is being studied from the days of *Susruta* to till date denotes its magnitude and complicacy. Aims and duties of

a surgeon, when called upon to treat an open wound, is to bring about the repair of the tissues in the manner, most conclusive to the welfare, present and future of the patients. Such an important responsibility cannot be carried out without a thorough and adequate knowledge of the retrospect of the drugs used in the process of wound healing, and of the factors which influence it. And to achieve this object, a screening of historical survey of the problem is essential. With this aims an attempt has been made to achieve the status of knowledge of *Vrana* and its *Ropana* since the beginning of the era of medicine.

### **Aims and Objects**

- \* To explore the complete status of *Vrana* and *Vrana-Ropana* with the gradual knowledge of wound and its healing from the modern aspect.
- \* To highlight the scope of research of fundamental and repeated advocacy in regards to *Vrana*.
- \* To compare the various changes happened in the modern medicine in respect to healing of wound.
- \* To know the basic established status of treatment and management of *Vrana* from the ancient point of you.

### **Historical Background**

Basic perception of wound healing lies only in its interpretation. Which has varied from civilization to civilization. But all these lead us to a universal truth of cure i.e. *Ropana*. To bring out the status of knowledge of *Vrana* and its *Ropana* since the begining of the era of medicine. This study is being carried out in the course of medicine order as adopted by Ralph H. Major:

### Mesopotamia (3600 B.C.)

This land is known as the cradle of civilization and the earliest source of medicine. The direct information on wound healing also exists. *Chot* represents *Vrana* and its *Upaya* means healing by various applications.

### Egypt (3500 B.C.)

Biblical accounts of Jews and Papyrii are main source of information like:-

- \* The techniques of prevention of infection and its influences on wound are available in Misra civilisation (3000 B.C.)
- \* There are evidences of a well-equipped kit perhaps today's first aid kit being used along with *Malham* (ointment), *Patti* (Bandage) and other required things in *Asva* civilization
- \* The surgical procedure of Vrana is also noticed in Babylon civilization in 2000 B.C.

China (2800 B.C.)

Chinese literature shows the reference of application of *Parada* on *Vrana*.

Greek and Greeko Roman (1600 B.C. – 476 A.D.)

Greek civilisation was heavily drawn by the Babylonians, the Cretons, the Egyptians and probably by the Indians after 400B.C. The following references are found in this era:

- \* The anatomy and treatment of Ksata has been noticed.
- \* Techniques to stop the bleeding and four characteristics of *Vrana* Sopha (inflammation) have been described in literatures of Rome civilization in 753 BC.
- \* Hippocrates who lived in the 500 BC. had faith in the healing power of nature so he favoured the use of simple dressing. He further advised the use of cold water with or without vinegar, wine, oil and honey for cleaning purpose followed by the dry bandaging. He also mentioned to avoid wet or greasy bandages. The edges of clean wounds were watched closely during healing.

India (3000 B.C. to till date)

Indian civilization is considered to be one of the greatest civilization in each aspect. Since the origin of Ayurveda is from this place therefore the Sanskret term *Vrana* is termed from the natural Indian medicine. In India a large number of references pertaining to the subject are scattered all around. The same is compiled here according to different periods

\* To cover up this era in a systematic way a chronological order is adopted as acquired by Prof. P V Sharma.

Ancient Period (3000B.C.-700 A.D.)

#### Rgveda

\* In Madhuvidya and Kaksyaya Vidya Vrana Rohana in reference to transplant the head of Yagya is found.

#### Samveda

\* Jaiminiya Brahamana mentions Vrana Rohana of a injured prince during war in 3/94-95.

#### Atharvaveda

- \* Laksa uses for Vrana Rohana as well as for haemostasis are mentioned in the Kausikasutra in 28/5/14.
- \* Example of regeneration is found in *Atharv.* 6/139/5
- \* Use of Mansa Rohini in Ropana of a Vrana and use of salt on unriped Vrana are existed in the Athary. 7/10/1-2
- \* Raksoghna dravya usage of Gomutra in Vrana and exploration of Pakva riped Vrana narrates in the Brahmana.
- \* Sastra Ksata is found in the Kausika Sutra.

### Ramayana

- \* Various *Lepas* for various *Agantuja Vranas* are mentioned during the war between Lord Rama and devil Rayana.
- \* Injured Laxmana was treated with drugs named Sanjivani.
  - "Sanjivani Visalya Karni Sandhana Karani and Savarrnya Karani".

#### Mahabharata

- \* There are statements that soldiers used to carry first aid kit along with them during war which contained honey, ghee and bandage.
- \* There are also references found pertaining to the collection and storage of drugs during the war period.

#### Buddha Kala

\* Dhupana, Taila, Varti, Lepa and Kvath were used for management of Vrana.

\* Application of *Tila Kvatha* and bandaging were also mentioned. References of cutting of extra grown *Mamsa* by salt *Kankari* are also exists.

#### Smrti and Purana

\* Administration of *Durva* and *Lepa* for the haemostasis are described in *Agni Purana*.

#### Maurya Kala (363-211B.C.)

- \* Management of Vrana by the means of Malhara Ksara Prayoga in the Menaner
- \* Management of Vrana are mentioned in Bhadant Nagsen

#### Kusana Kala (210 B.C.)

- \* A complete chapter on *Dvi Vraniya* exists in *Cikitsasthana* regarding *Vrana* and its thirty six measures are well explained in the *Caraka Samhita*.
- \* Management of Vrana exists in Cikitsa Sthana of Bhela Samhita.

#### Naga Vansa

- \* During this period Susruta Samhita was written and carried a detailed review of Vrana.
- \* It includes Sandhana of Karna-Nasa Khandostha and Sainya Cikitsa in Yuktasainya Adhyaya in detail.
- \* During this time the knowledge of wound was at its peak level as nearly fifty percent of the Salva Tantra deals only with the management of Vrana.
- \* Acarya Susruta being a surgeon himself could know its value better and so dealt almost all possible measures of wound in detail.
- \* The text Susruta Samhita abounds in various herbs for local and systemic use. Susruta has also dealt the clinical assessment of wound, union or healing and the dietetic restriction which favours early healing.
- \* He has also referred to congenital abnormalities while describing the bad prognosis of wound healing.
- \* Thus it would not be an exaggeration to say that Susruta had good grasp of the subject and was almost complete, when compared to that of today's knowledge on wound healing.

#### Kasyapa Samhita

Nija and Agantuja of Vrana and their management is available, especially to cure the mother and child when they suffered.

### Navnitka (2<sup>nd</sup> century)

Different *Lepas* and various types of *Tailas* are explained in detail with regard to the management of *Vrana* in 1<sup>st</sup> and 2<sup>nd</sup> Khand respectively.

### Astanga Sangraha (5th century)

- \* The knowledge of wound and its healing were edited and classified on stage basis by Vagbhata.
- \* He advocated preparation and applications of *Ghrta* and *Taila* based ointments for local use.
- \* The drugs in compound form were used at large.

#### Madhava Cikitsa (7th century)

Bhanga Vrana as well as Sadyo Vrana have been described in the chapter 45<sup>th</sup> and 46<sup>th</sup> of Madhaya Cikitsa.

### Vrnda Madhava (9th century)

Siddha Yoga has mentioned the management of Agantuja Vrana by Jatyadi Ghrta.

Medieval Period (701 A.D. to 1500 A.D.)

### Madhya Kala

It is clearly mentioned that during this period *Jakhmas* of *Suryamala* were treated by *Vaidyas*.

### Yoga Ratna Sammuccaya

Chandrahata has described *Tailadhikara* and *Kasayadhikara* amongst ten *Adhikaras*.

### Madhava Nidana (12th century)

Srikanta Dutta speaks about Vrana, its characters and classification in 41st

chapter and Sadyovrana in 42nd chapter.

### Sarangadhara Samhita (13th century)

Application of *Nimba Dala Kalka* in *Vranas Taila Kalpana* has mentioned for *Vrana* in the *Purvakhanda*.

### Satasloki (Bopadevasataka 13th century)

Chapter Taila Prakarana has been emphasised on Vrana.

Modern Period (1501 A.D. onward)

#### Bhava Prakasa (16th century)

Vrana, Vrana-Sotha, Vrana Sodhana and Vrana-Ropana are described in the Cikitsa Sthana chapter 47 in details.

Uses of different drugs with special reference to healing are also dealt.

### Yoga Cintamani (17th century)

Harshakirti has mentioned Lepa, Malhama etc. in Misraka Prakarana.

#### Vaidya Vallabha (1726)

At the time of mentioning the treatment of *Pada Vrana*, *Hastiruchi Kavi* speaks about the use of *Lepa* prepared from wax + resin + soap.

### Mugal Kala (1175 to 1836)

Sainya Cikitsa and plastic surgery especially Nasa Sandhana are described during this period.

### Bhaisajya Manimala (1953)

Krisharam Bhatt has given the description of Unani Malham.

Ayurveda has basically originated from India . A vast scope of research exists in the field of Ayurvedic fields for the benefit of the science and humanity at large. It is true that a number of scientists and medicine experts are working on various preparations which may help in achieving wound healing. A close study of Ayurveda reveals that a number of plants both locally as well as systemically were used to achieve the goal of *Vrana- Ropana*.

This paper shall not be completed without mentioning this work. The, work done upto 1998 in this direction by various institutes are as follows:

## Institute of Post Graduate Teaching and Research for Ayurveda, Jamnagar M.D.WORK

Vrana Ek Adhyana	Pandya K.K.	1974
Vrana Sodhana and role of Karanja	Trivedi Hari Suman	1979
Certain indeginous drugs on Vrana Sopha	Sharma MD	1979
Madhu Sarpi in Vrana Ropana	Chand & Amrut K	1981
Indeginous drugs in Vrana Ropana	Thomas T	1986
Karanjadi Ghrta in Dusta Vrana	Chowatia NM	1988
Sodhana and Ropana drugs in Dusta Vrana	Chowdhary AR	1990
Yastimadhvadi compound in Vrana Ropana	Gupta Rakhee	1995
Ph.D. WORK		
Role of Nyagrodhadi Ghrta and Udumbaradi		
Ghan Vati	Gupta Rakhee	1998
Institute of Medical Science, Varanasi		
M.D. WORK		
Wound healing & tissue regeneration by <i>Mansa Rohini</i>	Rao I	1966
Healing of wounds in Diabetes with <i>Udumbara</i>	Agrawal JS	1967
Corneal wound healing with indigenous drugs	Sharma C.P.	1967
Studies on Vrana Ropana	Mishra S.N.	1969
Studies on Vrana Sodhana	Sharma S.K.	1971

Ph.D. WORK			
Studies on wound healing w.e.r.	Paathak S.N.	1972	
burns & scalds		ŕ	
Effect of indigenous drugs on	Chansuria JPN	1975	
wound healing			
Ayurvedic College, Bangalore			
M.D. WORK			
Effect of Ksara Taila in Dusita Vrana	Shetty Narayana	1987	
Bandhana Karana through Patradana in Vrana	Huvin S.V.	1988	
Effect of Kasisadi Taila in Dustavrana	Mashetti N.B.	1989	
Effect of Triphala Guggulu in Vrana	ScinchaR. Keshava	1989	
Exp. study of Ksudra Sevantika in Sadyo Vrana	Narsimha	1990	
Government Ayurvedic College, Thiruvanthapuram			
MD. WORK			
Effect of Murivenna in healing of Dusta Vranas	Anitha O.	1989	
Rasa Sinduram & Rasa Karpuradi	Sanjeev LB	1990	
Dhupanam in Dusta Vrana			
Management of Dusta Vrana with	Bindu B.	1993	
Karkaradi Ghrtam			
Ayurvedic College, Hyderabad			
M.D. WORK			
Study of Vajraka Tailam in Dusta Vrana	Pani Saranga S	1985	
Swatha Malhar in Dagdha Vrana	Prasad KMVD	1987	
Svarna Ksiri in Dusta Vrana	Nagraj A	1990	
Karanjadi Tailam in Dusta Vrana	Rao Panduranga	1991	
Ayurvedic College, Nagpur			
M.D. WORK			
Dusta Vranome Tulasi Malham	Lakhpat AM	1992	
Ek Prayogika Adhyana			

Role of udumbara Ksira in Dusta Vrana

Faheem Oureshi

1993

### Middle Age (11th-14th century)

- \* In the 11th century pus formation was considered to be a healthy sign in the process of wound healing.
- \* But William Sacbiceto in 1210 A.D. of Bologna surgical school, held quite definitely that pus formation was a hazard for both the wound and the patients.
- \* This theory was also supported by Gay in 1368 who further added four points for treatment of wound i.e. removal of foreign body, reapproximation of parts, maintenance of general body resistance, conservation and reservation of the subject and checking of complications.
- \* These principles continued till the end of 14th century.

### Renaissance (1401-1600A.D.)

- \* The term renaissance or rebirth connotes a transition period between middle ages and modern era.
- \* The ancient physicians of Egypt, Greece, China, India and Europe developed gentle methods of treating wound.
- \* They main stress was on the requirement of removing foreign bodies, suturing, covering wounds with clean material and protecting the injured tissues from corrosive agents.
- \* With the emergence of gun powder and increase in the frequency of bullet injury during 14th century the new era of wound treatment emerged.
- \* Instead of maintaining the attitude of caretaker in the wound management and relying on the natural process of wound healing, surgeons assumed an aggressive attitude by changing the age old customs of application of boiling oil, hot cautery, scalding water, gentle washing with warm water and application of mild *salve*, but the cleaning part was left unattended.
- \* Needless to say 'Lets do something about it' attitude towards wound healing, the results of new innovations proved disastrous.

Modern Medicine (From 1600A.D. onwards)

#### Period of 16th to 17th century-

- \* Ambrose Pare a great French Army surgeon rediscovered gentle methods during the battle of Valance in 16<sup>th</sup> century.
- \* The surgeon was forced to apply milder treatments to the amputation wounds, and noticed that these wounds healed much faster and with lesser complications. And from this, the beginning of modern era of gentle wound healing evolved.
- \* John Hunter, William Stewart, Alexin Carrel and many other great clinical biologists emphasised and demonstrated that by minimising the tissue injury we can produce rapid and effective healing.
- \* The ethics of wound healing is based on "Minimal Interference" concept.
- \* If a surgeon can remove all impediments, normal wound healing processes produce the best results.

### Period of 17th to 18th century-

- \* John Hunter brought out that a wound heals faster if suppuration after suturing due to ancients hands of surgeons was stopped.
- \* But they could not bring out the actual organism responsible for suppuration. This was later discovered by Louis Pasteur (1822-95).

### Period of 20th century-

- \* This period is considered to be one of the most important era in the history of medicine.
- \* During world war I (1914-1918) the greatest difficulty faced was of curing of wound and their protection from infection from outside factors like skin, clothing, missiles, and dirty soil, which would have had serious repercussions like streptococcus, tetanus, gangrene which would have spread and rapidly converted with muscles into a mass of putrefying flesh distended with stink.
- \* It was the mobile casualty cleaning stations equipped with every operative necessity, which came to their rescue.
- \* The wounded were first given the first aid and were brought in ambulance to nearest hospital for treatment.

- \* However it was not certain that the wound would heal even if it was surgically treated well, chances of infection were still not ruled out.
- \* This was continued till the Spanish war in 1937–39 when another new surgical enterprise came into existence.
  - Paul Ehrlich discovered chemotherapeutic agents which were useful in treatment of contaminated wounds.
  - Once Penicillin was isolated this drug was widely used in curing the wound.
    It was used both for prophylaxis and cure of contamination.
  - Now a days number of antibiotics specially of broad spectrum and ampicillin are used to prevent and cure suppuration.

#### Period from 1939 onwards

- \* This period was influenced by world war II and the advent of sulphonamides and antibiotics.
- \* Debridement of wound and prophylactic inoculation against tetanus took place. Scientific study towards wound healing was first done by Alexis Carrel et.
- \* He evaluated the observations on the surface of wounds and watched the process of healing in laboratory on animals and patients to demonstrated the effect of age, temperature, infections and other conditions of wound healing.
- \* The present knowledge of wound healing was based on visual observation.
- \* The light microscopic development and recently the electron and polarising microscope, including the X ray refraction and auto radiographic studies have assisted a lot in the development of science of wound healing.

#### Conclusion

The historical survey of wound and its healing suggest that the gradual development in modern medicine is the mirror of ancient findings.

It is clear that without any experiment which already took place in ancient era, the minimal interference with removal of all impediments by means of *Sodhana* with consideration of *Ropana* with *Vranitopasana* are the only solution of *Vrana* for healing with minimal scarring.

To establish the accuracy and usefulness of the fundamental principles, that *Vrana Ropana* is a subject that has its reigning from the beginning of mankind.

It can be proved by the very fact, that *Vrana* has been dealt since beginning of *Veda* to current era and has been a major problem since the early stages of medical study.

This fact has been dealt by Susruta. It shows its antiquity or importance. Similarly, in the west the description of disease dates back to the date of Hippocrates.

Thus the dressings for both acute and chronic wounds have changed dramatically.

The new principles of wound care have evolved many new types of dressings for wound treatment.

Old concepts have been corrected the facts, and have been substituted for appearances and demonstration for impression.

Techniques have been simplified and standardized so that many procedures previously of value to only a small group of specialist are now being carried out effectively by every surgeon willing to acquaint him with the precepts laid down.

The efforts are being made every day by medical sciences in order to overcome the above said problems in healing.

The same is also being tried by Ayurvedic experts to provide a good herbal remedy free from the side effects.

All the remedial agents used for the management of wounds have broadly been classified under the headings of *Vrana Sandhaniya* which includes both the *Sodhana* and *Vrana Ropaniya* measures. Therefore it is necessary to know the historical successful applications in the past era and its limitations, than only a research of new technique or say cure of wounds can be explored.

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### सारांश

# व्रण चिकित्सा - एक ऐतिहासिक सर्वेक्षण

राखी मेहरा

व्रण - इतिहास मानव सस्यता की पुरातनता से सम्बंधित है। क्योंकि प्रथम दर्द की अभिव्यक्त मानव को चोट से अवश्य हुई होगी इसलिये प्रारम्भ से ही मनुष्य इसके उपाय की और अग्रसर रहा है। हर युग में वृण चिकित्सा का स्वरूप भिन्न रहा है। प्रस्तुत लेख में इन्ही संदर्भों को एक जगह एकत्रित करने का प्रयास किया गया है। प्राचीन से नवीनतम विधियों का कालबद्द रूप में विवरण सिद्द करता है कि सूक्ष्म से स्थूल और पुनः स्थूल से सूक्ष्म व्रण चिकित्सा के संदर्भ में किस तरह परिवर्तित हुई है और किस तरह प्राचीन विधियों की सार्थकता सिद्द होती है। आज अवश्यकता है तो इन पद्दतियों का चिकित्सकीय दृष्टि से अनुसंधान करने की।