

CONCEPTUAL UNDERSTANDING OF WET GANGRENE - AN AYURVEDIC PERSPECTIVE

Geetha N S¹, Rakesh RN², Subhas Bhakta³

¹Corresponding Author, PG Scholar, Department of Shalya Tantra, SDM College of Ayurveda, Udupi.

² Associate Professor, Department of Shalya Tantra, SDM College of Ayurveda, Udupi.

³ Assistant Professor, Department of Shalya Tantra, SDM College of Ayurveda, Udupi.

Corresponding Author: msgeetha2023@gmail.com

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ABSTRACT

Gangrene is a clinical condition characterised by tissue death due to disrupted blood flow, often resulting from underlying health issues, injuries, or compromised immunity. It's a serious condition that can result in the amputation of the limb. The main types include wet and dry - commonly afflicted sites - toes, fingers, feet and hands. Wet gangrene, noted for its rapid spread and high risk, parallels the *Ayurveda* concept of *Dushta Vrana*¹, which describes wounds which are prone to severe complications. It is a prevalent issue in surgical practice, often complicated by factors like infection. Although wound healing is a natural process, it can be hindered by *Dosha* (causative factor) imbalance and microorganisms. This article explores wet gangrene's incidence, prevalence, and treatment implications while integrating insights from *Ayurvedic* medicine regarding wound management and susceptibility to infection.

Keywords: Gangrene, *Dusta vrana*, *Dosha*, wound management.

INTRODUCTION

Ayurveda provides a comprehensive understanding of "Vrana" (wound), its classification and management

through various local and systemic approaches. The concept of *Vrana*² has been an integral part of human

health care since ancient times. The *Brihatrayi* (classical texts) - *Charaka Samhita*, *Sushruta Samhita*, and *Astanga Hridaya* - offer deep insights into the nature of wounds and their treatment. *Sushruta* (1000 BC), in his text *Sushruta Samhita*, laid down a comprehensive account of surgical techniques, 60 procedures for managing wounds and various medicinal therapies, which remain relevant in contemporary medical practices. *Ayurveda* describes *Dusta vrana* (infective ulcer) as a complex wound characterised by an ulcer with a nonhealing tendency, foul smell, pain, chronicity, callosity, and pus discharge. If left untreated, it can lead to gangrene.

“*Vrana*, a wound that destroys tissue and ultimately leaves a lifelong scar³” contrasts sharply with gangrene, a condition characterised by persistent infection that can continue even after death. Untreated wounds in high-risk individuals progress to gangrene in a short time and are life-threatening. Wet gangrene is a condition characterised by tissue death due to infection, tissues in moist areas often resulting from poor blood circulation and bacterial invasion. It presents with discolored or blackened tissue, usually accompanied by a foul odour and sloughing. Early recognition is crucial, as gangrene can lead to high mortality rates and significant quality of life impairment for survivors.

MATERIALS AND METHODS

The study draws from classical *Ayurvedic* texts and modern sources, including textbooks, academic articles, and various web-based resources. These materials serve as the foundation for the detailed exploration of the disease and its treatment methods as described in *Ayurveda*.

DISEASE REVIEW

Gangrene implies the death of macroscopic portions of tissue *in situ*⁴. The term necrosis may be used synonymously. It often affects the distal part of limbs because of arterial obstruction (from thrombosis, embolus, or arteritis). There are three types: wet, dry, and gas gangrene⁵.

Wet gangrene is characterised by moist and edematous limbs, with color changes that vary between dark red, green, purple, and black owing to sulphurated hydrogen produced by the putrefactive bacteria acting upon the liberated haemoglobin due to haemolysis.

Bacteria like *Clostridium perfringens* or *Bacillus fusiformis* infect the tissue, causing swelling and foul odour. The condition progresses rapidly, often due to obstructing venous or arterial blood flow, resulting in stagnant blood that facilitates bacterial growth. A high bacterial load generally presents with a poor prognosis due to the associated risk of septicemia.

The characteristics of wet gangrene are⁶

1. Vein obstruction prevents blood from leaving the part, leading to no fresh blood entering. Liquefaction and bacterial infection cause moist gangrene.
2. The affected area is cold, pulseless, swollen, and edematous. The skin develops raised blebs containing foul-smelling fluid.
3. Characterized by horrible odour.
4. There is little to no formation of a line of demarcation.
5. Constitutional symptoms are severe, unlike dry gangrene, where they are nearly absent.
6. The leading causes of moist gangrene include acute inflammation, long-standing venous thrombosis, bed sores, and gas gangrene.

Dry gangrene typically affects the distal limbs, particularly the toes and feet. It is commonly seen in elderly individuals with conditions like arteriosclerosis. It arises from arterial occlusion and ischemia (restricted blood supply), causing tissue to dry out and darken, resembling mummified flesh. It spreads slowly because bacteria struggle to survive in the desiccated environment. The affected tissue becomes dry, shrivelled and dark reddish black, signaling significant damage.

Gas Gangrene is a rapid-spreading infective gangrene of the muscles characterised by a gas collection in the muscles and subcutaneous tissue caused by *Clostridium perfringens*. It is also known as *Clostridial myonecrosis*.

In gangrene, the body naturally tries to remove dead tissue by forming a zone of demarcation between liv-

ing and dead tissue, marked by granulation tissue. In dry gangrene, this line of separation forms within days, allowing quick soft tissue separation, though bone takes longer. Conical separation occurs due to a lower blood supply to the skin and subcutaneous tissue than to muscles and bones. In contrast, moist gangrene has little formation of a separation line due to infection, causing rapid disease to spread. Thus, converting moist gangrene to dry gangrene is preferred for better management.

In *Ayurveda*, the concept of *Vrana* encompasses much more than superficial skin. It also impacts muscles, blood vessels, ligaments, bones and joints⁷. It is classified into two categories based on aetiopathology. *Nija vrana*, which arises from *Dosha* imbalance within the body, and *Agantuja Vranas* are caused by external injuries, such as cuts, blunt trauma, burns, poisoning, or chemical exposure⁸. Based on the

Symptoms include:

Avastha (stage), it is further divided into *Shudha vrana* (clean wound) and *Dushta vrana* (infected wound).

DUSHTA VRANA

Vrana is caused by external or internal factors that imbalance the *Tridoshas-vata*, *pitta*, and *kapha*. Pathogenesis of *Dusta vrana* is due to *Margavarana* (encapsulation) and *Dhatu kshaya* (tissue depletion)⁹. *Margavarana* is an obstruction of nutrient-carrying channels by morbid *Kapha* and *Pitta*, disrupting the flow of *Vata dosha* and leading to the death of tissue. This obstruction affects circulation at the blockage site and distally, leading to poor nutrient supply and *Dhatu kshaya* in the affected area. This impaired circulation slows the wound healing process, increasing infection risk and tissue necrosis.

Features	<i>Sushruta Samhita</i>	<i>Charaka Samhitha</i> ¹⁰	<i>Madava Nidana</i> ¹¹
Size	<i>Atisamruta</i> -Narrow mouthed <i>Ativivruta</i> -Wide mouthed <i>Atiavasanna</i> -Depressed <i>Ati utsana</i> -Elevated Irregular shape and cavities: Suggesting underlying tissue destruction Everted edges: The chronic nature of the wound results in everted wound edges, further delaying healing.	<i>Avasanna vartma</i> (depressed margin) <i>Atistoola vartma</i> (thick)	-
Shape	Other than <i>Ayatha</i> , <i>Chatusra</i> , <i>Vrita</i> , and <i>Triputa</i> , these shapes indicate <i>Dusta vrana</i>	<i>Kumbimukhatvam</i> Narrow mouthed	-
Consistency	<i>Ati Mridu</i> -Soft <i>Ati Katina</i> – hard	<i>Atipidakatvam</i> – Numerous boils	-
Skin discoloration	<i>Raga</i> – Redness <i>Varna</i> – discharge in blackish reddish yellow <i>Bhairava</i> - Frightful,	<i>Shwetha</i> – pallor <i>Pinjara</i> – grey <i>Atiraktaneela</i> – reddish, bluish	<i>Shudha Linga Viparyaya</i>
Srava	<i>Putisrava</i> Excessive discharge: Often plus mixed with blood, accompanied by excruciating pain	<i>Bahusrava</i>	<i>Putisrava</i> <i>Dusta asrik</i>
Pain	-	<i>Atishoola</i>	<i>Ruja</i>

Other features	<i>Dheergakalanubandi</i> <i>Putimamsasirasnayu</i> - filled with putrid and sloughing flesh and fetid pus <i>Durgandha</i> - Foul odor Indicative of necrosis and infection. <i>Unmargi</i> - oblique tract <i>Utsangi</i> - deep <i>Amanojnadarshana</i> - With ugly sight <i>Kandu</i> – Itching <i>Shopha</i> – Swelling <i>Pidaka</i> - With boils	<i>Putiganda</i> - foul smell	<i>Utsangi</i> - sinuses <i>Chirastit</i> - chronic <i>Putiganda</i>
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Table 1: *Dusta Vrana Lakshana*'s according to different Acharyas.

Dushta Vrana is essentially a non-healing wound marked by a persistent infection, putrefied discharge and severe wound characteristics, contrasting with *Shuddha Vrana* (Healing ulcer).

Complications

Dustavrana involving deeper structures left untreated leads to systemic complications¹² like *Jwara* (Pyrexia), *Atisara*, *Murcha* (Septic shock), *Hikka*, *Swasa*, *Kasa* (Shortness of breath, respiratory failure), *Chardi* (Vomiting), *Arochaka* (anorexia), *Avipaka* and *Trusna* (Metabolic disturbances dehydration).

MANAGEMENT

Dushta vrana includes treatments that promote healing, reduce infection, and restore tissue health. Formulations like *Panchatiktaghritguggulu*, *Triphalaguggulu*, *Gandhakararayana*, and *Arogyavardhini rasa*, which is predominantly composed of *Tiktha*¹⁴ (bitter) substance, act at the cellular level to reduce skin keratinization and improve the cell cycle.

1. *Chedana*¹⁴ (Excision): The primary approach involves surgical removal of *Putibhava* (necrosed tissue), which significantly spreads infection and allows granulation.
2. *Shodhana*¹⁵ (Purification techniques): *Vamana-Shirovirechana* (upper purification) and *Virechana-asthapana* (lower purification) are used to detoxify the body.
3. *Rakthamokshana* (Bloodletting): Often employed for *Pitta dosha* imbalance linked to inflammation. It prevents capillary and venous stasis and helps with proper venous drainage. *Jalukavaracharana* (leech therapy) enhances circulation beyond blood removal; leech saliva de-

livers enzymes like hyaluronidase and collagenase, anticoagulants and vasodilators, promoting enhanced healing.

4. *Vrana Prakshalana* (Wound cleansing): Preparations like *Panchavalkala Kwatha*, *Triphala Kwatha* and *Manjistadi Kwatha* are known for their *Shothahara* (anti-inflammatory) *Vrana Ropana* (healing) properties. *Nyagrodhadi gana*, *Aragvadhadi* and *Surasadigana*¹⁶ are beneficial for wound cleaning.
5. *Taila*: Oil preparations like *Vajraka taila*¹⁷, *Syandana taila*¹⁸, *Bhallatakadya taila*, *Sarshapa taila* are effective in treating *Dustavrana*.

Dietary adjustments

A diet rich in *Tiktha*¹⁹ (bitter), *Katu* (pungent), and *Kashaya* (astringent) substances supports healing and reduce infection. Soups made from herbs like *Tanduliyaka*, *Jivanti*, and *patola*, along with *Saktu* (flour paste), *Vilepi* (thick gruel), and boiled water, promote wound healing. The diet should be easy to digest, unctuous, warm, and stimulate digestion.

Food prepared from freshly harvested grains like black gram, sesame, round pea, horse gram, jaggery, curd, alcohol, and overeating before digesting the previous meal should be avoided²⁰.

In addition to herbal formulations, therapies like cleansing and surgical methods such as excision and suturing enhance healing and minimise discharge. These treatments aim to facilitate recovery, reduce infection, and restore tissue health. Proper manage-

ment can clean the wound, and the underlying *doshic* imbalances can be addressed to promote complete healing.

MANAGEMENT OF WET GANGRENE²¹

Conservative management of gangrene emphasises keeping the affected area dry and converting moist gangrene to dry for a good prognosis. It includes limb-saving measures such as antibiotics, vasodilators, pain management, care for the area, and preventive strategies like avoiding injuries and ensuring nutritional support. Depending on the severity and extent of tissue damage, surgical options may involve life-saving procedures like amputation.

DISCUSSION

Gangrene is a life-threatening condition resulting from tissue death, predominantly caused by infection or compromised blood circulation. Wet gangrene, known for its aggressive progression and the risk of septicemia, bears similarities to the *Ayurvedic* concept of *Dushta vrana*, which refers to infected, chronic wounds. As outlined by *Sushruta*, the *Ayurvedic* approach to wound management emphasises local and systemic treatments aimed at purifying and healing the affected tissues. This comprehensive view highlights the close connection between modern gangrene management and traditional *Ayurvedic* wisdom, especially in dealing with non-healing, infected wounds.

Modern medicine focuses on arresting infection through debridement, antibiotics, and sometimes surgical interventions like amputation. *Ayurvedic* medicine parallels this by utilising surgical excision by *Chedana*, *Shodhana* (purification) techniques like *Rakthamokshana* (bloodletting) to remove toxins and *Vrana prakshalana* (wound cleansing) with herbal decoctions to reduce inflammation and promote wound healing. The conversion of wet gangrene to dry gangrene is a crucial goal in both systems of medicine to minimise infection risk and allow for safer tissue removal. *Jalukavacharana* (leech therapy) improves circulation and reduces tissue damage, highlighting its efficacy in managing infected wounds by removing toxins and stimulating healing.

The *Ayurvedic* management of *Dushta Vrana* incorporates the balancing of *Doshas*—*Vata*, *Pitta* and *Kapha* - which are believed to play a vital role in wound healing. The *Vata-Pithahara* line of treatment can be adopted. *Ayurvedic* formulations are utilised for their anti-inflammatory, antibacterial, and wound-healing properties, which help cleanse the wound, manage infection and facilitate tissue regeneration at a cellular level. Nutritional and dietary considerations include a diet rich in bitter and astringent foods, which is recommended to promote wound healing. This is similar to modern interventions that target bacterial load reduction, promote tissue repair, and emphasise the importance of nutrition in immune support and recovery during wound healing.

Treatment methodologies emphasise timely diagnosis, preventing infection spread and proper wound care. Modern medicine primarily focuses on antibiotic therapy, surgical debridement, and amputation in severe cases. At the same time, *Ayurveda* offers a more holistic approach, focusing on external wound care and internal body detoxification to address underlying *Dosha* imbalances.

CONCLUSION

Effective management of Gangrene, particularly wet gangrene, calls for a comprehensive and integrated approach. Modern medical interventions, such as antibiotics, debridement, and surgical procedures, are critical for saving lives and halting infection. However, the holistic principles of *Ayurveda*, rooted in ancient practices like *Shodhana* (detoxification) and *Pathya* (dietary regulation), provide valuable support in promoting long-term healing and preventing recurrence by integrating these complementary systems of modern medicine's rapid intervention with *Ayurveda*'s focus on restoring balance and enhancing tissue regeneration. There is potential for improved outcomes in treating chronic, non-healing wounds like gangrene. This fusion of ancient wisdom and contemporary practice can offer a more complete healing process, enhancing patient recovery and quality of life.

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