

A Comprehensive Review on Vranashotha: An Ayurvedic Perspective on Inflammatory Wound Management

Dr. Bhargav Patel¹, Dr. Shailesh R Jaiswal²

- 1- 2nd Year PG scholar, Department of Shalya tantra, Parul institute of Ayurveda and research, Parul university, Vadodara, Gujarat-391760. ORCID ID: <https://orcid.org/0009-0005-1786-3181>
- 2- Professor Department of shalya tantra, Parul institute of Ayurveda and research, Parul university, Vadodara, Gujarat-391760.

*Corresponding author: Dr. Shailesh R. Jaiswal, Email: Shailesh.skp61@gmail.com

DOI: <https://doi.org/10.63001/tbs.2026.v21.i02.pp324-333>

KEYWORDS

Vranashotha, Shotha, Inflammation, Ayurveda, Wound swelling, Abhighataja Shotha, Ama Shotha, Pakva Shotha, Vrana.

Received on:
18-02-2026

Accepted on:
04-04-2026

Published on:
14-04-2026

Abstract

Background: Vranashotha is an Ayurvedic term used to describe localized inflammatory swelling that occurs in or around a wound (Vrana). It results from the vitiation of Tridoshas (Vata, Pitta, and Kapha) due to factors like trauma, infection, improper dietary practices, systemic diseases, or surgical complications. Classical Ayurvedic texts such as the Sushruta Samhita provide detailed descriptions of the stages, causes, symptoms, and treatment of Vranashotha, which closely resemble modern concepts of inflammation.

Aim: To present a comprehensive review of the Ayurvedic understanding of Vranashotha, correlate it with modern inflammatory pathology, and outline integrated approaches for its effective management.

Methods: This review critically analyzes Ayurvedic classical references from texts such as Sushruta Samhita and Ashtanga Hridaya, and compares them with current biomedical literature on inflammation. Ayurvedic treatment protocols, formulations, and therapies have been reviewed alongside modern medical interventions to establish a comparative framework.

Results: Vranashotha is classified into Ama (immature), Pachyamana (suppurative), and Pakva (mature abscess) stages. Symptoms such as redness (Raga), heat (Ushna), swelling (Shotha), and pain (Vedana) are common to both Ayurveda and modern inflammation. Management in Ayurveda includes internal medicines like Trivrit Churna, Punarnava, Guggulu, and Triphala, along with external therapies such as Swedana (sudation), Lepa (herbal paste), and Jalaukavacharana (leech therapy). Modern management typically includes antibiotics, NSAIDs, and surgical drainage.

Conclusion: Vranashotha serves as a classical example of the convergence between traditional Ayurvedic and modern biomedical concepts of inflammation. With its holistic, stage-wise therapeutic strategies, Ayurveda offers a valuable, complementary approach to managing wound-related inflammatory conditions. Integrative management, combining Ayurvedic wisdom with modern surgical and pharmaceutical care, holds promise for improved outcomes in chronic or complicated wound inflammations.

INTRODUCTION

The term "Vranashotha" is composed of two Sanskrit words — Vrana meaning

wound and Shotha meaning inflammation or swelling. In Ayurveda, it describes the

localized swelling occurring due to infection or trauma associated with wounds. **Vranashotha** is a condition described in Ayurveda as the **inflammatory swelling that develops in or around a wound (Vrana)**. The term is derived from the Sanskrit expression: "Shotha vrane bhavati iti Vranashotha", meaning **"that which presents as swelling in a wound is called Vranashotha."** It is characterized by localized signs of inflammation such as redness, heat, pain, and swelling, and is considered a pathological response of the body due to injury, infection, or doshic imbalance. This condition is commonly encountered in Ayurvedic surgical practice (**Shalya Tantra**) and is managed based on the stage of inflammation and the involvement of specific doshas.

Vranashotha is a frequently encountered condition in the domain of **Shalya Tantra**, the Ayurvedic surgical discipline that addresses a wide range of disorders through surgical and para-surgical procedures. This branch of Ayurveda is particularly effective in managing conditions presenting with **Shotha** (swelling), which correlates with inflammation in modern medical science.

According to **Acharya Sushruta**, **Vranashotha** is a form of localized inflammatory swelling that arises around wounds or ulcers (Vrana), presenting with classical symptoms such as **increased local temperature (Sthanika Ushma)**, **swelling (Vruddhi/Utsedha)**, and **pain (Vedana)**. Ayurveda offers a comprehensive range of therapeutic measures for the management of Vranashotha. These include **Abhyanga** (therapeutic massage), **Lepa** (herbal paste application), and **Jalaukavacharana** (leech therapy), which are chosen based on the stage and nature of the inflammation. A number of herbal formulations and drugs such as **Gokshura**, **Guggulu**, **Punarnava**, and **Triphala** are used due to their anti-inflammatory, detoxifying, and healing properties. The clinical manifestation of Vranashotha varies depending on the stage of the condition. In the **Aamavastha** (early or immature stage), the symptoms are mild, including slight pain and swelling. In the **Pachyamana avastha** (suppurative or progressing stage), patients may experience burning or pricking pain along with discoloration of the skin. In the **Pakwavastha** (mature stage), more severe features like wrinkling of the skin, cracking, and itching may be evident.

❖ Types of Shotha Based on Dosha Involvement

Type of Shotha	Doshic Involvement	Characteristics
Vataja Shotha	Predominance of Vata	Dryness, roughness, severe pain, and pulsating swelling

Type of Shotha	Doshic Involvement	Characteristics
Pittaja Shotha	Predominance of Pitta	Redness, burning sensation, heat, and tenderness
Kaphaja Shotha	Predominance of Kapha	Heaviness, cold touch, itching, and firm swelling
Vata-Pittaja Shotha	Combination of Vata and Pitta	Burning pain with throbbing sensation and discoloration
Pitta-Kaphaja Shotha	Combination of Pitta and Kapha	Warm, soft, heavy swelling with yellowish discoloration
Kapha-Vataja Shotha	Combination of Kapha and Vata	Hard, cold swelling with mild pain and stiffness

Classical References of Vranshotha

Text	Section & Verse	Reference Details
Sushruta Samhita	Sutra Sthana 17/7	Describes the three stages of Shotha (swelling): 1. Ama Shotha – Initial/immature stage 2. Pachyamana Shotha – Suppurative stage 3. Pakva Shotha – Mature abscess with pus
Sushruta Samhita	Chikitsa Sthana 1/8–10	Explains Abhighataja Shotha (trauma-induced inflammation) and doshic imbalance as causes of Vranshotha; outlines its pathogenesis and management

Etiological Factors (Nidana)

S. No.	Cause	Description (Paraphrased)
1	Improper wound cleansing	Inadequate or incorrect cleaning of wounds may lead to infection and inflammatory swelling
2	Underlying diseases like Jwara and Pandu	Pre-existing conditions such as fever (Jwara) or anemia (Pandu) can reduce immunity and predispose to swelling
3	Fasting or dietary incompatibility	Long-term fasting (Upavasa) or consuming incompatible/contradictory foods weakens digestion and immunity
4	Excessive intake of sour and pungent foods	Overconsumption of Amla (sour) and Teekshna (sharp/spicy) foods disturbs Pitta and causes inflammation
5	Trauma or injury (Abhighata)	Physical injuries, including blunt force or surgical trauma, can directly lead to inflammatory swelling
6	Diabetes and other systemic disorders	Metabolic disorders like diabetes impair wound healing and increase risk of infection and inflammation
7	Faulty surgical procedures	Improper surgical techniques or post-operative care may result in secondary infection and swelling

Pathogenesis (Samprapti)

Trauma or injury leads to the vitiation of the **Tridoshas**—Vata, Pitta, and Kapha—which collectively contribute to the development of **Vranshotha**. When

Vata is aggravated, it produces symptoms such as **pain**, **dryness**, and a **pulsating sensation** in the affected area. The involvement of **Pitta** and **Rakta** (blood

tissue) results in **redness**, **increased local temperature (heat)**, and the formation of **pus** due to suppuration. Meanwhile, **Kapha** aggravation contributes to **swelling**, **heaviness**, and **stiffness** in the inflamed region. The combined effect of these vitiated doshas creates a pathological state

of **localized inflammation**, which appears in and around the wound and is clinically recognized as **Vranshotha** in Ayurvedic literature.

This interaction results in localized inflammation in and around the wound, manifesting as Vranshotha.

Dosha Involved	Effects / Symptoms	Contribution to Vranshotha
Vata	Pain, dryness, pulsating or throbbing sensation	Initiates pain and functional disturbance in the affected area
Pitta + Rakta	Redness, heat (local temperature rise), suppuration (pus formation)	Leads to inflammation, burning, and infection-like manifestations
Kapha	Swelling, heaviness, stiffness	Contributes to the bulk of the inflammatory swelling
Combined Effect	Interaction of all three doshas at the site of trauma or injury	Results in localized inflammation known as Vranshotha

Clinical Features (Lakshana)

Symptoms of Vranashotha

In **Vranashotha**, the swelling is often **movable**, covered with **thin and fragile skin**, and tends to have a **rough and uneven texture**. The color may appear **reddish (Aruna)** or **dark (Asita)**. Such swelling can be **intermittent** in nature—subsiding on its own without intervention and reappearing unexpectedly. It may also be associated with symptoms like **numbness (Sushupti)** and **tingling or excitement (Harsha)**. When **Pitta Dosha predominates**, the swelling is usually **smooth and soft**, sometimes with a **distinct odor**. It may be accompanied by **fever (Jwara)**, **dizziness (Bhrama)**, **excessive sweating (Sweda)**, **thirst (Trishna)**, **delirium or intoxication-like**

feeling (Mada), **burning sensation (Daha)**, **tenderness (Sparsha Asahatva)**, and signs of **suppuration (Paka)**. In **Kapha-dominant Vranashotha**, the swelling is generally **firm, heavy**, and associated with **loss of appetite (Aruchi)**, **excessive sleep (Nidra)**, **nausea or vomiting (Vamana)**, and **sluggish digestion (Mandagni)**. When both **Pitta and Kapha** are involved, the symptoms present a **mixed picture**, showing features of both doshas. **Abhighataja Shotha** (traumatic swelling) is caused by **external injuries** such as incisions (**Cheda**), punctures (**Bheda**), lacerations (**Kshata**), or contact with aggravating factors like **cold winds (Hima Anila)**, **sea breeze (Abdhi**

Anila), or irritant substances such as **Bhallataka**. Acharyas also explain that **vitiated Vata** when obstructed by **Rakta Dhatu** (blood tissue) results in **Raktavrita Vata**, producing symptoms like **burning, pain, reddish discoloration, and localized swelling**—these signs align closely with

the modern understanding of **acute inflammation**.

1. **Shotha** (Swelling)
2. **Raga** (Redness)
3. **Ushna** (Local heat)
4. **Toda/Vedana** (Throbbing pain)
5. **Gandha** (Foul smell if infected)

Type of Vranashotha / Shotha	Key Features / Symptoms
General Vranashotha	Movable swelling, thin skin, rough surface, reddish/dark color, tingling, spontaneous cycles of remission and recurrence
Pittaja Shotha	Smooth, soft swelling, foul smell, fever, dizziness, sweating, thirst, delirium, burning sensation, tenderness, pus formation
Kaphaja Shotha	Hard and heavy swelling, loss of appetite, lethargy, vomiting, excessive sleep, weak digestion
Pitta-Kaphaja Shotha	Combination of symptoms from both Pitta and Kapha: moderate burning, heaviness, mild fever, and sluggish metabolism
Abhighataja Shotha	Swelling due to trauma (cut, puncture, injury), or contact with cold wind, sea breeze, or irritant substances like Bhallataka
Raktavrita Vata (Obstructed Vata by Rakta)	Burning sensation, pain, reddish discoloration, swelling—resembles modern acute inflammation

Ayurvedic Management (Chikitsa)

The management of Vranashotha is based on the stages of inflammation: In **Vata-dominant Shotha**, internal use of **Trivrit Churna** is advised to balance aggravated Vata. Dietary recommendations include easily digestible and nourishing items such as **Shali rice, cow's milk (Ksheera), and meat soup (Mamsarasa)**. **Sudation therapy (Swedana)** using Vata-alleviating herbs, gentle **massage (Abhyanga)**, and **tapping (Sparshana)** with medicated oils are beneficial. **Pouring (Sinchana)** and **application of herbal**

pastes (Lepana) with Vata-reducing medications are also advised.

For internal decoctions, combinations of **Shunti (ginger), Punarnava, Erandamula, and Panchamula** are used. Additional formulations include decoctions made with **Trivrit, Guduchi, Haritaki, Bibhitaki, and Amalaki**, as well as **Triphala powder mixed with Gomutra (cow's urine)**. In more chronic or stubborn cases, a decoction of **Patola, Haritaki, Bibhitaki, Amalaki, Nimba twak, and Daruharidra** combined with **Shuddha Guggulu** is recommended.

In cases with significant **Kapha involvement**, **therapeutic emesis (Vamana)** is considered the best option. **Punarnavadi Kalka** (herbal paste) with **Gomutra**, and a decoction of **Punarnava**, **Guduchi**, **Daruharidra**, **Dashamula**, **Ardra** juice, old jaggery, and powdered **Shunti** are also used to promote detoxification and healing.

Topical applications include various **herbal lepas (pastes)** such as **Tila Lepa** (prepared using sesame paste and butter), **Yashtyadi Lepa** (a mixture of Yashtimadhu paste with milk, ghee, and sesame), **Punarnavadi Lepa** (which includes Kanji of Punarnava with

Devadaru, Shunti, Sarshapa, and Shigru bark), and **Darvadi Lepa** made from Devadaru, Guggulu, and Shunti. Another effective paste is **Bibhitaki Lepa**, prepared from the seeds of Bibhitaki.

For dietary management, **Pathya (wholesome)** items include **aged rice**, **horse gram**, **green gram**, **barley**, **meat from desert-dwelling animals**, **old ghee**, **alcohol**, **honey**, **buttermilk**, **fermented decoctions**, and vegetables such as **bitter gourd**, **young radish**, **carrot**, **Indian gooseberry (Amla)**, and **red drumstick**. Avoidance of incompatible and heavy foods forms the **Apathya** (non-beneficial) part of treatment.

Therapy/Medicine	Purpose/Effect
Trivrit Churna (in Vata-predominance)	Laxative and Vata-shamana
Shali rice, milk, meat soup	Nourishing, easy to digest, Vata-pacifying
Swedana, Abhyanga, Tapping with medicated oils	Vata-reducing, relieves stiffness and pain
Sinchana and Lepana with Vata-alleviating herbs	Local application to reduce swelling and pain
Decoction of Shunti, Punarnava, Erandamula, Panchamula	Anti-inflammatory and Vata-Kapha balancing
Trivrit, Guduchi, Haritaki, Bibhitaki, Amalaki decoction	Detoxification and inflammation control
Triphala Churna with Gomutra	Detoxifying, antimicrobial, promotes healing
Patola, Haritaki, Amalaki, Nimba twak, Daruharidra + Guggulu	Anti-inflammatory and wound-purifying
Punarnavadi Kalka with Gomutra	Anti-swelling and diuretic effect
Punarnava, Guduchi, Daruharidra, Dashamula, Ardra, old jaggery + Shunti powder	Balances Tridosha and promotes wound healing
Vamana (in Kapha-dominant cases)	Eliminates excess Kapha, reduces heaviness and edema

Modern Medical Perspective

Definition and Mechanism

Inflammation is defined as a complex biological response to harmful stimuli, characterized by five cardinal signs:

1. **Rubor** (Redness)
2. **Calor** (Heat)
3. **Tumor** (Swelling)
4. **Dolor** (Pain)
5. **Functio laesa** (Loss of function)

From a modern medical standpoint, **inflammation** is the body's natural defense response triggered by harmful stimuli such as **microbial infections (bacteria, viruses), chemical toxins, or physical injury**. Upon encountering such stimuli, the **immune system** is activated. Specialized immune cells—primarily **inflammatory cells** and **cytokines**—are deployed to the affected site. These cells work to **neutralize pathogens**, contain the damage, and initiate **tissue repair mechanisms**. As a result, the affected individual typically experiences classic signs of inflammation such as **pain, redness, swelling, and sometimes bruising or warmth** at the site.

Inflammation is broadly classified into **two types**:

1. **Acute Inflammation** – This is a **rapid and short-term immune response** to sudden injury or infection. Inflammatory cells immediately reach the site to repair the damaged tissue and begin healing.
2. **Chronic Inflammation** – This occurs when the inflammatory response **persists over a long period**, even in the absence of an ongoing threat. It is commonly seen in autoimmune conditions like **rheumatoid arthritis**, where the immune cells **mistakenly attack healthy tissues**, leading to ongoing tissue damage.

Typical symptoms of both acute and chronic inflammation include **flushed or red skin, localized pain or tenderness, swelling, and increased warmth** in the affected area.

Type	Description (Paraphrased)
Acute Inflammation	Sudden, short-term response to injury or infection; immune cells rush to site for quick repair
Chronic Inflammation	Long-term, often self-perpetuating response; immune system attacks body's own tissues

Symptom	Explanation
Flushed or Red Skin	Due to increased blood flow to the injured or infected area
Pain or Tenderness	Caused by stimulation of nerve endings by inflammatory mediators
Swelling	Due to fluid accumulation and immune cell infiltration
Heat (Local Warmth)	Results from increased blood circulation at the site

Modern Treatment

- Broad-spectrum antibiotics (e.g., Amoxicillin, Clindamycin)
- NSAIDs for pain and inflammation
- Incision and drainage for abscess
- Wound dressing and antiseptic cleaning

Ayurveda-Modern Comparative Table

Ayurvedic Concept	Modern Correlation
Vranashotha	Inflammatory wound, cellulitis
Ama Shotha	Acute inflammation
Pakva Shotha	Abscess
Shastra Karma	Surgical incision & drainage
Vrana Shodhana Dravyas	Antiseptics/Antimicrobial agents
Ropana Dravyas	Wound healing ointments

CONCLUSION

Vranashotha, as described in Ayurvedic texts, particularly in the domain of **Shalya Tantra**, represents a localized inflammatory condition arising due to trauma, infection, or doshic imbalance in and around a wound. The classical Ayurvedic explanation aligns remarkably well with the modern pathophysiological understanding of **inflammation**, especially in conditions like **acute abscess**, and **wound infections**. The ancient sages, led by Acharya Sushruta, outlined comprehensive diagnostic and therapeutic approaches for Shotha and its various stages (Ama, Pachyamana, and Pakva), which correspond with modern classifications of **acute and chronic inflammation**.

Ayurveda employs a holistic approach in the management of

Vranashotha, incorporating **internal medications**, **external applications**, **dietary regulation**, and even **surgical and para-surgical interventions**. Herbs like **Punarnava**, **Guggulu**, **Triphala**, and **Daruharidra**, along with therapies like **Swedana**, **Lepa**, and **Vamana**, offer anti-inflammatory, detoxifying, and healing effects that are now increasingly validated by modern pharmacological research. Similarly, procedures like **Shastra Karma** (surgical drainage) and **Vrana Shodhana** (cleansing of wounds) mirror principles seen in current **wound care and surgical debridement**.

By drawing a parallel between Ayurvedic and modern views of inflammation, especially in the context of Vranashotha, this review highlights the timeless relevance of classical Ayurvedic

principles. A judicious integration of both systems—leveraging **Ayurveda’s personalized, stage-wise treatment with modern diagnostics and emergency interventions**—can greatly enhance the clinical management of inflammatory wound conditions. Thus, **Vranashotha serves as a vital bridge between traditional healing wisdom and contemporary medical practice**, offering insight into a multidisciplinary approach to wound and inflammation care.

References

1. **Sushruta**. Sushruta Samhita. Edited by Acharya JT. Varanasi: Chaukhamba Orientalia; reprint ed. 2017. Sutra Sthana 17, Chikitsa Sthana 1.
2. **Charaka**. Charaka Samhita. Edited by Tripathi B. Varanasi: Chaukhamba Surbharati Prakashan; reprint ed. 2017. Chikitsa Sthana 25.
3. **Vagbhata**. Ashtanga Hridaya. Edited by Paradakara HS. Varanasi: Chaukhamba Sanskrit Sansthan; reprint ed. 2017. Sutra Sthana 12.
4. **Bhavamishra**. Bhavaprakasha Nighantu. Commentary by Chuneekar KC. Varanasi: Chaukhamba Bharati Academy; reprint ed. 2015.
5. **Sharangadhara**. Sharangadhara Samhita, Madhyama Khanda. Varanasi: Chaukhamba Surbharati Prakashan; reprint ed. 2016.
6. **Sharma S**. Rasatarangini. Commentary by Shastri K. Delhi: Motilal Banarsidass; reprint ed. 2014.
7. **Sharma PV**. Dravyaguna Vigyan, Vol I & II. Varanasi: Chaukhamba Bharati Academy; 2010.
8. **Chakrapani Datta**. Ayurveda Deepika Commentary on Charaka Samhita. In: Charaka Samhita. Edited by Tripathi B. Varanasi: Chaukhamba Surbharati Prakashan; reprint ed. 2017.
9. Kumar V, Abbas AK, Aster JC. Robbins and Cotran Pathologic Basis of Disease. 10th ed. Philadelphia: Elsevier; 2020.
10. Norman S, O’Connell PR, McCaskie A. Bailey & Love’s Short Practice of Surgery. 28th ed. CRC Press; 2022.
11. Ralston S, Penman I, Strachan M, Hobson R. Davidson’s Principles and Practice of Medicine. 23rd ed. Elsevier; 2018.
12. Jameson JL, Fauci AS, Kasper DL, Hauser SL, Longo DL, Loscalzo J. Harrison’s Principles of Internal Medicine. 21st ed. New York: McGraw-Hill; 2022.
13. Gladwin M, Trattler B, Mahan CE. Clinical Microbiology Made Ridiculously Simple. 7th ed. Miami: MedMaster; 2017.
14. World Health Organization. WHO Guidelines on Wound and Inflammation Management. Geneva: WHO Press; 2019.
15. Craig CR, Stitzel RE. Modern Pharmacology with Clinical Applications. 6th ed. Philadelphia: Lippincott Williams & Wilkins; 2003.
16. Suśruta. Suśruta Samhitā with Nibandhasaṅgraha Commentary of Dalhaṇa. Edited by Vaidya Yadavji Trikamji Acharya. Varanasi: Chaukhamba Orientalia; reprint ed. 2018. Chikitsa Sthana 1, Sutra Sthana 22.
17. Caraka. Caraka Samhitā with Ayurveda Dīpikā Commentary of Cakrapāṇi Datta. Edited by Yadavji Trikamji Acharya. Varanasi: Chaukhamba Orientalia; reprint ed. 2019. Sutra Sthana 18.
18. Vāgbhaṭa. Aṣṭāṅga Saṅgraha. Edited by Sharma S. Varanasi: Chaukhamba Sanskrit Series; reprint ed. 2016. Sutra Sthana 23.
19. Bhela. Bhela Samhitā. Edited by Girijadayalu Shukla. Varanasi: Chaukhamba Bharati Academy; reprint ed. 2015.
20. Kaśyapa. Kaśyapa Samhitā (Vṛddha Jīvaka Tantra). Edited by Sharma H. Varanasi: Chaukhamba Sanskrit Sansthan; reprint ed. 2017.
21. Sharma PV. Cakradatta (Chakrapāṇi Datta). Varanasi: Chaukhamba Orientalia; reprint ed. 2014.

22. Tripathi I. Rasaratna Samuccaya. Varanasi: Chaukhamba Sanskrit Sansthan; reprint ed. 2013.
23. Nadkarni KM. Indian Materia Medica, Vol I & II. Mumbai: Popular Prakashan; reprint ed. 2014.
24. Anonymous. The Ayurvedic Pharmacopoeia of India, Part I, Vol I–VI. New Delhi: Ministry of AYUSH, Government of India; 2001–2016.
25. Anonymous. The Ayurvedic Formulary of India, Part I & II. New Delhi: Ministry of AYUSH, Government of India; 2010.
26. Guyton AC, Hall JE. Textbook of Medical Physiology. 14th ed. Philadelphia: Elsevier; 2021.
27. Kumar P, Clark M. Kumar & Clark's Clinical Medicine. 10th ed. Elsevier; 2020.
28. Abbas AK, Lichtman AH, Pillai S. Cellular and Molecular Immunology. 10th ed. Philadelphia: Elsevier; 2022.
29. Medzhitov R. Inflammation 2010: New adventures of an old flame. Cell. 2010;140(6):771–776.
30. Eming SA, Martin P, Tomic-Canic M. Wound repair and regeneration. Science. 2014;343(6174):124841.
31. Diegelmann RF, Evans MC. Wound healing: an overview of acute, fibrotic and delayed healing. Front Biosci. 2004;9:283–289.
32. Singer AJ, Clark RAF. Cutaneous wound healing. N Engl J Med. 1999;341:738–746.
33. Guo S, DiPietro LA. Factors affecting wound healing. J Dent Res. 2010;89(3):219–229.
34. Percival SL, et al. The antimicrobial efficacy of wound dressings. Int Wound J. 2015;12(4):396–405