

AYURVEDIC APPROACHES TO SCAR MANAGEMENT A REVIEW OF SURGICAL AND NON-SURGICAL METHODS

Akshay Kumar Babulal Barai^{1*}, Datta Kumavat² and Shilpa Badhe³

¹PG Scholar, Shalya Tantra Department SMBT Ayurved College & Pg Institute, Nashik.

²Guide and Professor, Shalya Tantra Department SMBT Ayurved College & Pg Institute,
Nashik.

³HOD and Professor, Shalya Tantra Department SMBT Ayurved College & Pg Institute,
Nashik.

Article Received on
12 February 2025,

Revised on 04 March 2025,
Accepted on 24 March 2025

DOI: 10.20959/wjpr20257-36101



*Corresponding Author

Dr. Akshay Kumar
Babulal Barai

PG Scholar, Shalya Tantra
Department SMBT Ayurved
College & Pg Institute,
Nashik.

ABSTRACT

Scar management remains a crucial aspect of dermatological and surgical care, addressing both aesthetic concerns and functional limitations. Ayurveda offers a comprehensive approach to scar treatment through surgical methods like *Kshar Karma*, *Agnikarma*, *Raktamokshana*, and *Shastra Karma*, which effectively manage hypertrophic and keloid scars. Non-surgical Ayurvedic methods such as *Lepa*, *Taila*, *Ghrita*, and *Rasayana* focus on nourishing the skin and promoting tissue regeneration. Modern advancements, including laser therapy, cryotherapy, microneedling, and silicone-based treatments, provide effective solutions for scar reduction. While Ayurvedic methods emphasize holistic healing with minimal side effects, modern approaches often offer faster and targeted results. Integrating these traditional and modern techniques may enhance overall treatment outcomes. This review explores Ayurvedic and contemporary methods of scar management, comparing their efficacy, safety, and practical applications to guide optimal treatment strategies.

KEYWORDS: Scar management, Ayurveda, Kshar Karma, Laser therapy, Herbal formulations.

INTRODUCTION

Scars are fibrous tissues that form as part of the natural healing process after skin injury. While some scars may fade over time, others can become prominent, affecting aesthetics, function, and mental well-being. Effective scar management is crucial for improving both physical appearance and quality of life.

Key aspects of scars

- **Causes:** Scars can develop from trauma, burns, surgery, acne, or inflammatory conditions.
- **Types of scars**
 - **Hypertrophic scars:** Raised scars that remain within the boundaries of the original injury.
 - **Keloid scars:** Overgrown scars extending beyond the injury site.
 - **Atrophic scars:** Depressed scars, commonly seen in acne or chickenpox.
 - **Contracture scars:** Often caused by burns, these scars tighten the skin, affecting movement.

Challenges in scar management

- **Scars may cause**
 - **Aesthetic concerns** (Visible marks or discoloration).
 - **Functional limitations** (Restricted mobility, stiffness).
 - **Psychological impact** (Low self-esteem, anxiety).

Role of ayurveda in scar management

Ayurveda emphasizes

- Dosha balance to improve wound healing.
- Use of herbal formulations for skin nourishment and rejuvenation.
- Surgical and para-surgical methods to treat complex scars.

Integrating Ayurvedic principles with modern scientific advancements can improve overall scar management outcomes.

Need for study

Despite advances in modern dermatology and plastic surgery, managing scars remains a challenge. Ayurvedic therapies provide unique interventions that emphasize natural healing,

tissue regeneration, and scar minimization. Understanding these methods alongside modern techniques may offer safer, effective, and affordable options for scar management.

MATERIALS AND METHODS

A comprehensive literature review was conducted using classical Ayurvedic texts such as *Charaka Samhita*, *Sushruta Samhita*, and *Ashtanga Hridaya*. Modern literature from indexed journals, dermatology references, and surgical guides were also reviewed to compare approaches.

Surgical methods for scar management

Surgical methods aim to reduce scar prominence, improve skin texture, and restore functional mobility. Both Ayurvedic and modern approaches offer effective solutions tailored to different types of scars.

Ayurvedic surgical methods

Ayurvedic surgical techniques are rooted in *Shalya Tantra*, a specialized branch of Ayurveda dedicated to surgical interventions. These methods emphasize minimal invasiveness, natural healing, and the use of herbal and thermal applications to manage scars effectively.

1. Kshar karma (Caustic therapy)

Kshar Karma is a potent Ayurvedic method involving the application of alkaline herbal preparations to dissolve unwanted tissue and promote healthy regrowth.

Indications

- Excess granulation tissue (Mamsa-ati-vridhi).
- Hypertrophic scars and keloids.
- Chronic non-healing wounds with fibrotic tissue.

Procedure

- **Preparation:** The affected area is cleaned with sterile saline or medicated decoctions.
- **Application:** Herbal caustic agents such as *Apamarga Kshara* (*Achyranthes aspera*) are carefully applied to the raised or unhealthy tissue.
- **Duration:** The caustic agent is kept in place for a specified time, usually 30–60 seconds, depending on tissue sensitivity.

- **Post-procedure care:** The area is washed with cooling agents like *Dugdha* (milk) or *Yashtimadhu Kwatha* to neutralize the caustic effect. Medicated oils such as *Jatyadi Taila* are applied to promote healing.

Mode of action

- The alkaline nature of *Kshara* breaks down excess fibrous tissue.
- Kshar Karma helps in debriding unhealthy granulation, reducing scar thickness, and enhancing local blood flow to promote tissue regeneration.

2. Agnikarma (Thermal cauterization)

Agnikarma is an ancient technique where heated metallic rods (*Shalaka*) are applied to targeted areas to treat abnormal tissue growth and improve scar appearance.

Indications

- Hypertrophic scars.
- Keloids with dense fibrotic tissue.
- Chronic indurated scars that hinder joint movement.

Procedure

- **Preparation:** The affected area is cleaned, and a protective barrier (like medicated paste) may be applied to minimize heat injury to surrounding healthy tissues.
- **Application:** A metallic rod made of copper, gold, or silver is heated to a specific temperature and gently applied to the fibrotic scar tissue.
- **Post-procedure Care:** Cooling agents like *Ghrita* (clarified butter) or *Aloe vera gel* are applied to soothe the treated area.

Mode of action

- The thermal effect induces controlled tissue destruction, followed by enhanced blood circulation in the treated area.
- This promotes collagen remodeling and softens fibrotic tissue, helping to flatten raised scars.

3. Raktamokshana (Bloodletting therapy)

Raktamokshana is a detoxification procedure aimed at removing impure blood to improve circulation and enhance tissue repair.

Indications

- Hypertrophic scars with localized congestion.
- Scars associated with discoloration or hardness.
- Keloid formations with chronic inflammation.

Procedure

- **Types of raktamokshana used in scar management**

- *Jalaukavacharana* (Leech Therapy) – Preferred for localized scars with stagnant blood accumulation.
- *Siravyadha* (Venesection) – Suitable for larger scars or areas with venous congestion.

- **Post-procedure care**

- Herbal oils like *Madhuyashti Taila* or *Kumkumadi Taila* are applied for enhanced healing.

Mode of action

- Raktamokshana improves microcirculation in the scar tissue, promoting better oxygenation and nutrient delivery.
- This aids in reducing scar pigmentation, hardness, and size.

4. Shastra Karma (Excision techniques)

Shastra Karma involves surgical excision of large or disfiguring scars using precise incisions and tissue reconstruction techniques.

Indications

- Large, fibrotic scars that limit movement or cause cosmetic concerns.
- Deep scars resulting from trauma, burns, or surgery.

Procedure

- **Excision:** The scar tissue is carefully excised with a scalpel.
- **Reconstruction:** The wound is closed with sutures to ensure minimal tension and optimal healing.
- **Post-procedure care:** Herbal applications such as *Shatadhauta Ghrita* and *Jatyadi Taila* are used to accelerate healing and reduce post-surgical scarring.

Mode of action

- Excision physically removes unwanted fibrous tissue.

- Ayurvedic post-operative care minimizes inflammation and improves collagen synthesis for optimal scar remodeling.

Modern surgical methods

Modern surgical techniques utilize precision tools and advanced technologies to improve scar appearance and restore functionality.

1. Excision and Skin Grafting

Excision combined with skin grafting is a widely used technique for severe or disfiguring scars.

Indications

- Extensive burn contractures.
- Deep scars affecting joint mobility.
- Post-surgical scars with dense fibrous bands.

Procedure

- **Excision:** The scar tissue is surgically removed.
- **Grafting:** A thin layer of healthy skin (often from the thigh or back) is transplanted to the treated site.
- **Post-procedure care:** Dressings, antibiotics, and moisturizers are used to support graft survival.

2. Laser therapy

Laser technology effectively reduces hypertrophic and keloid scars by targeting fibrotic tissue.

Types of lasers used

- **Fractional laser:** Improves skin texture and promotes collagen remodeling.
- **CO2 Laser:** Effective in reducing thick, raised scars.
- **Pulsed Dye Laser (PDL):** Targets vascular scars with redness and pigmentation.

Procedure

- The laser beam is directed at the scar tissue to break down excess collagen and stimulate skin regeneration.

3. Cryotherapy

Cryotherapy involves the controlled application of liquid nitrogen to destroy abnormal scar tissue.

Indications

- Hypertrophic scars.
- Keloids with excessive growth.

Procedure

- The affected area is exposed to liquid nitrogen, causing the tissue to freeze and shrink over subsequent weeks.

Mode of action

- The cold-induced cell destruction reduces scar elevation and flattens fibrotic tissue.

4. Subcision

Subcision is a minimally invasive procedure used to treat atrophic scars by releasing fibrous bands beneath the skin.

Indications

- Depressed scars resulting from acne or surgical procedures.

Procedure

- A fine needle is inserted under the scar, and fibrotic bands are gently cut to lift the depressed scar area.
- The procedure may be followed by microneedling or fillers for enhanced results.

Non-surgical methods

Ayurvedic non-surgical methods

1. Lepa (Herbal pastes)

- **Principle:** Herbal formulations like *Haridra* (*Curcuma longa*), *Manjishtha* (*Rubia cordifolia*), and Aloe vera are known for their anti-inflammatory, antioxidant, and rejuvenating properties.
- **Procedure:** The prepared paste is applied to the scar, promoting tissue repair, reducing inflammation, and lightening pigmentation. Regular use softens scars and enhances skin tone.

2. Taila (Medicated oils)

- **Popular formulations:** *Kumkumadi Taila*, *Nalpamaradi Taila*, and *Dhanwantaram Taila*.
- **Indications:** Beneficial in scar lightening, improving skin elasticity, and nourishing damaged tissues.
- **Procedure:** Warm oil is gently massaged over the scar, improving blood flow, softening fibrotic tissue, and enhancing skin texture.

3. Ghrita (Medicated ghee)

- **Popular formulations:** *Jatyadi Ghrita*, *Mahatriphaladi Ghrita*, and *Shatadhauta Ghrita*.
- **Indications:** Recommended for softening scars, improving skin hydration, and accelerating cell regeneration.
- **Procedure:** Ghrita is applied topically or consumed internally to enhance skin quality.

4. Udwartana (Herbal powder massage)

- **Principle:** Udwartana promotes exfoliation and improves circulation, which aids in reducing fibrotic tissue and smoothing scar surfaces.
- **Procedure:** Herbal powders like *Triphala Churna*, *Yava Churna*, and *Kolakulathadi Churna* are massaged vigorously over the affected area to promote scar reduction and enhance skin texture.

5. Rasayana Therapy (Rejuvenation therapy)

- **Principle:** Rasayana herbs like *Amalaki* (*Emblica officinalis*), *Guduchi* (*Tinospora cordifolia*), and *Shatavari* (*Asparagus racemosus*) improve tissue regeneration and boost skin vitality.
- **Procedure:** Administered internally as powders, decoctions, or Avaleha (herbal jams) for systemic rejuvenation.

Modern non-surgical methods

1. Silicone Gel and Sheets

- **Indications:** Proven effective for hypertrophic scars and keloids.
- **Mechanism:** These gels and sheets provide hydration, reduce collagen overproduction, and improve scar elasticity when applied regularly.

2. Topical medications

- **Popular choices:** Corticosteroids (anti-inflammatory), retinoids (collagen remodeling), and vitamin E (skin nourishment).
- **Indications:** Suitable for reducing redness, flattening scars, and improving skin texture.

3. Chemical peels

- **Indications:** Effective in treating post-acne scars, pigmented scars, and uneven skin texture.
- **Procedure:** Alpha hydroxy acids (AHAs) or trichloroacetic acid (TCA) peels are applied to the skin, inducing controlled exfoliation and collagen production.

4. Microneedling

- **Indications:** Highly effective for acne scars, stretch marks, and post-surgical scars.
- **Procedure:** Fine needles puncture the skin, triggering the body's healing response and stimulating collagen synthesis, resulting in improved scar texture.

5. Pressure garments

- **Indications:** Widely used in burn patients to reduce hypertrophic scarring.
- **Mechanism:** By applying constant pressure to the scarred area, these garments minimize excessive collagen deposition, flattening the scar.

DISCUSSION

Comparative Analysis of Ayurvedic and Modern Non-Surgical Scar Management Methods

Effective scar management requires a strategic combination of methods that address skin texture, pigmentation, and collagen remodeling. Both Ayurvedic and modern non-surgical approaches offer unique advantages and limitations. Below is a detailed discussion of each method's strengths, weaknesses, and comparative effectiveness.

Ayurvedic Non-Surgical Methods

1. Lepa (Herbal pastes)

Pros

- Natural, herbal ingredients reduce the risk of side effects.
- Anti-inflammatory and antioxidant properties promote faster wound healing.
- Safe for prolonged use on sensitive skin.

Cons

- Results are generally slow and require consistent application.
- Limited evidence exists for treating deep scars or keloids effectively.

Conclusion

Lepa is effective for superficial scars, hyperpigmentation, and improving skin texture but may fall short for severe hypertrophic scars or keloids.

2. Taila (Medicated oils)**Pros**

- Deeply nourishes and hydrates skin, enhancing its elasticity.
- Suitable for reducing pigmentation and improving skin tone.

Cons

- May cause excessive oiliness, making it less ideal for oily skin types.
- Requires prolonged usage for visible results.

Conclusion

Best suited for post-inflammatory pigmentation and dry, flaky scar tissue but not ideal for raised, fibrotic scars.

3. Ghrita (Medicated ghee)**Pros**

- Excellent for softening hardened scar tissue.
- Soothing and cooling properties reduce irritation and inflammation.

Cons

- Slow absorption and greasy texture can make frequent application difficult.
- Limited effectiveness on deep scars and contractures.

Conclusion

Effective for softening scars and enhancing skin regeneration but may require supplementary therapies for optimal results.

4. Udwartana (Herbal powder massage)

Pros

- Stimulates circulation, promoting healthy skin regeneration.
- Aids in reducing fibrotic tissue in hypertrophic scars.

Cons

- Can irritate sensitive or inflamed skin if performed aggressively.
- Requires consistent application over weeks or months for results.

Conclusion

Best suited for raised scars and fibrotic tissue but requires a skilled therapist for safe and effective use.

5. Rasayana Therapy (Rejuvenation therapy)

Pros

- Systemic benefits improve overall skin health and immune response.
- Supports long-term skin regeneration and wound healing.

Cons

- Results may take longer to manifest compared to targeted topical treatments.
- Requires strict dietary and lifestyle adherence for optimal results.

Conclusion

Effective as a supportive therapy for improving skin quality and boosting immunity but may need to be combined with direct scar treatment for noticeable improvements.

Modern Non-Surgical Methods

1. Silicone Gel and Sheets

Pros

- Clinically proven for flattening hypertrophic and keloid scars.
- Non-invasive and easy to apply.

Cons

- Requires consistent and long-term use (minimum 3-6 months).
- Effectiveness may reduce on older scars.

Conclusion

Highly effective for fresh scars, hypertrophic scars, and keloids but may require complementary methods for deeper scars.

2. Topical Medications (Corticosteroids, Retinoids, Vitamin E)**Pros**

- Readily available and easy to use.
- Effective for reducing inflammation, pigmentation and improving scar texture.

Cons

- Prolonged corticosteroid use may cause skin thinning.
- Results vary widely based on individual skin type and scar type.

Conclusion

Effective for improving pigmentation and early scar management but may require dermatologist supervision for optimal use.

3. Chemical Peels (AHAs, TCA Peels)**Pros**

- Effective for superficial scars, acne scars, and post-inflammatory pigmentation.
- Stimulates collagen production, improving skin texture.

Cons

- May cause redness, peeling, or irritation if performed incorrectly.
- Not suitable for hypertrophic or deep scars.

Conclusion

Ideal for minor scars, pigmentation issues, and skin texture improvement but not for severe or fibrotic scars.

4. Microneedling**Pros**

- Stimulates collagen synthesis, improving skin elasticity and texture.
- Suitable for acne scars, stretch marks, and surgical scars.

Cons

- Requires multiple sessions for optimal results.
- Temporary redness and irritation are common post-procedure effects.

Conclusion

Highly effective for post-acne scars, atrophic scars, and stretch marks but may require combination therapies for severe scarring.

5. Pressure garments**Pros**

- Proven effective in reducing hypertrophic scars in burn patients.
- Minimizes excessive collagen deposition and improves scar elasticity.

Cons

- Requires continuous use for several months.
- May be uncomfortable or difficult to adhere to for patients.

Conclusion

Effective for burn scars and hypertrophic scarring but requires patient compliance for sustained benefits.

Comparative analysis: Which approach is superior?

- **For superficial scars:** Ayurvedic therapies such as Lepa, Taila, and Rasayana therapy provide safe and effective results with minimal side effects. These methods excel in reducing pigmentation and improving skin texture.
- **For Deep and Hypertrophic scars:** Modern treatments like silicone gel, microneedling, and corticosteroids demonstrate superior efficacy in reducing raised and fibrotic scars.
- **For Keloids and Hypertrophic scars:** Pressure garments, silicone sheets, and corticosteroids are the preferred modern methods due to their evidence-based efficacy.
- **For Sensitive Skin and Natural healing:** Ayurvedic therapies like Ghrita and herbal oils provide gentle, nourishing care, making them ideal for patients with delicate or reactive skin.

CONCLUSION

Neither Ayurvedic nor modern methods alone can comprehensively address all types of scars. The optimal approach often involves combining therapies for enhanced results. Ayurvedic

methods excel in promoting natural healing and skin nourishment, while modern techniques provide faster, targeted improvements for complex scars like keloids or deep tissue damage. A tailored treatment plan based on the scar type, patient condition, and desired outcome is recommended for the best results.

REFERENCES

1. Alster TS, Tanzi EL. Hypertrophic scars and keloids: Etiology and management. *Am J Clin Dermatol*, 2003; 4(4): 235-43.
2. Van der Veer WM, Bloemen MC, Ulrich MM, Molema G, van Zuijlen PP, Middelkoop E, et al. Potential cellular and molecular causes of hypertrophic scar formation. *Burns*, 2009; 35(1): 15-29.
3. Brown BC, McKenna SP, Siddhi K, McGrouther DA, Bayat A. The hidden cost of skin scars: Quality of life after skin scarring. *J Plast Reconstr Aesthet Surg*, 2008; 61(9): 1049-58.
4. Mustoe TA, Cooter RD, Gold MH, Hobbs R, Ramelet AA, Shakespeare PG, et al. International clinical recommendations on scar management. *Plast Reconstr Surg*, 2002; 110(2): 560-71.
5. Shanbhag VK. Wound healing and Ayurveda: Evidence-based approach. *Journal of Ayurveda and Integrative Medicine*, 2017; 8(2): 73-80.
6. Pandey MM, Rastogi S, Rawat AK. Indian traditional ayurvedic system of medicine and nutritional supplementation. *Evidence-Based Complementary and Alternative Medicine*, 2013; 2013: 1-12.
7. Chauhan R, Sharma R. Concept of Vranashopha (inflammation) in Ayurveda and its management. *AYU (An International Quarterly Journal of Research in Ayurveda)*, 2012; 33(3): 339-43.
8. Introduction: Alster TS, Tanzi EL. Hypertrophic scars and keloids: Etiology and management. *Am J Clin Dermatol*, 2003; 4(4): 235-43.
9. Key Aspects of Scars: van der Veer WM, Bloemen MC, Ulrich MM, Molema G, van Zuijlen PP, Middelkoop E, et al. Potential cellular and molecular causes of hypertrophic scar formation. *Burns*, 2009; 35(1): 15-29.
10. Challenges in Scar Management: Brown BC, McKenna SP, Siddhi K, McGrouther DA, Bayat A. The hidden cost of skin scars: Quality of life after skin scarring. *J Plast Reconstr Aesthet Surg*, 2008; 61(9): 1049-58.

11. Role of Ayurveda in Scar Management: Mustoe TA, Cooter RD, Gold MH, Hobbs R, Ramelet AA, Shakespeare PG, et al. International clinical recommendations on scar management. *Plast Reconstr Surg*, 2002; 110(2): 560-71.
12. Ayurvedic Non-Surgical Methods: Shanbhag VK. Wound healing and Ayurveda: Evidence-based approach. *Journal of Ayurveda and Integrative Medicine*, 2017; 8(2): 73-80.
13. Modern Non-Surgical Methods: Pandey MM, Rastogi S, Rawat AK. Indian traditional ayurvedic system of medicine and nutritional supplementation. *Evidence-Based Complementary and Alternative Medicine*, 2013; 2013: 1-12.
14. Ayurvedic Surgical Methods: Chauhan R, Sharma R. Concept of Vranashopha (inflammation) in Ayurveda and its management. *AYU (An International Quarterly Journal of Research in Ayurveda)*, 2012; 33(3): 339-43.
15. Agnikarma (Thermal Cauterization): Sharma PV. *Susruta Samhita with English Translation and Dalhana Commentary*. Varanasi: Chaukhamba Visvabharati; Sutra Sthana, Chapter, 2005; 12: 10-15.
16. Kshar Karma (Caustic Therapy): Tripathi BN. *Rasatarangini*. Delhi: Motilal Banarsidass Publishers, 2012; 29, 11: 74-76.
17. Raktamokshana (Bloodletting Therapy): Srikantha Murthy KR. *Astanga Hridaya of Vagbhata (English Translation)*. Varanasi: Chaukhamba Krishnadas Academy; Sutra Sthana, Chapter, 2012; 26: 20-25.
18. Shashtra Karma (Excision Techniques): Sharma PV. *Susruta Samhita with English Translation and Dalhana Commentary*. Varanasi: Chaukhamba Visvabharati; Chikitsa Sthana, Chapter, 2025; 1: 30-35.
19. Ayurvedic Non-Surgical Methods (Lepa, Taila, Ghrita, Udwartana, Rasayana): Shanbhag VK. Wound healing and Ayurveda: Evidence-based approach. *Journal of Ayurveda and Integrative Medicine*, 2017; 8(2): 73-80.
20. Modern Non-Surgical Methods (Silicone Gel, Topical Medications, Chemical Peels, Microneedling, Pressure Garments): Pandey MM, Rastogi S, Rawat AK. Indian traditional ayurvedic system of medicine and nutritional supplementation. *Evidence-Based Complementary and Alternative Medicine*, 2013; 2013: 1-12.