

Exploring the Multidimensional Mechanisms and Clinical Practice of “Simmering Pus and Growing Flesh” in Wound Healing

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Abstract:

The “simmering pus and growing flesh” technique, which translates to “promoting granulation by fostering pus,” is a distinctive external treatment approach in traditional Chinese medicine (TCM) surgery. It emphasizes the formation of a specific exudate (“pus”) on the wound bed through the topical application of herbal formulations, utilizing this exudate as a reparative medium to facilitate granulation tissue proliferation and wound healing. This paper systematically reviews the historical origins of this theory, elucidates its TCM mechanism characterized by “drug-wound interaction leading to pus generation and tissue growth,” and clarifies its scientific rationale from modern perspectives including immune modulation, angiogenesis, and microenvironment improvement. Based on this analysis, classical and contemporary TCM preparations derived from this theory and their clinical applications in managing chronic wounds are summarized. The aim is to provide a theoretical foundation and clinical reference for wound repair strategies within TCM surgery.

Keywords:

Simmering Pus and Growing Flesh, Wound Healing, Drug-Wound Interaction, Traditional Chinese Medicine Surgery, Mechanism

1. Introduction

The “simmering pus and growing flesh” technique is one of the characteristic therapies in traditional Chinese medicine (TCM) surgery and plays a crucial role in promoting wound healing. This method involves the topical application of herbal preparations to induce a specific type of “pus” on the wound surface, which then serves as a medium to promote granulation tissue growth and wound repair. It emphasizes the dynamic repair mechanism of “drug-wound interaction” and “pus generation leading to flesh growth.” With the deepening modern medical understanding of the wound microenvironment, an increasing number of studies have shown that the “simmering pus and growing flesh” technique exerts multi-target synergistic effects in immune regulation, angiogenesis, acid-base balance, and maintenance of a moist environment. This paper aims to systematically review the

historical origins and TCM mechanisms of this theory, elucidate its scientific connotations in conjunction with typical medical cases and modern research findings, and summarize the clinical applications of TCM preparations derived from this theory, thereby providing theoretical support and practical guidance for wound repair in TCM surgery.

The concept of “simmering pus and growing flesh,” as a unique diagnostic and therapeutic principle in TCM external therapy, first appeared in the Ming dynasty in Shen Douyuan’s “Treatise on the Appropriateness of Applying Medicinal Plasters to Sores and Ulcers,” in *Illuminating the Mysteries of External Medicine*: “When a sore or toxin has already flattened, with pus and fluid not yet diminished, the ulceration has stabilized, or there is slight pain or itching and the flesh has not yet grown, if no plaster is applied, the exposed red flesh has no protection and cannot withstand wind and cold. Therefore, applying *Taiyi* plaster and the like will ‘simmer’ the pus and grow flesh; wind evil cannot invade, and internally one should supplement and support the interior so that *qi* and blood flow smoothly, the spirit recovers, and all sores part become strong—how could they deteriorate?” [1] In the Great Chinese Dictionary, “偎” (*wēi*) means to cling closely or be intimately attached. Thus, “偎脓长肉” (*Weinong Zhangrou*, “simmering pus and growing flesh”) in *Illuminating the Mysteries of External Medicine* refers to applying external plasters tightly to the wound surface to protect the pus and promote granulation tissue growth. With the continuous development of TCM, the expression “偎脓长肉” (*Weinong Zhangrou*, “simmering pus and growing flesh”) gradually appeared in ancient medical texts, where “偎” (*wēi*) is extended to mean slow, gentle heating over a fire. Hence, “simmering pus and growing flesh” refers to the application of herbal preparations when pus is mature and the ulcer has ruptured but necrotic tissue has not yet sloughed off; the slow, gentle “simmering” warms and unblocks *qi* and blood, tonifies genuine *qi*, harmonizes *yin-yang* and *qi*-blood balance, enables the thick white pus on the wound to carry evil outward, and ultimately achieves the goal of expelling putridity and generating new flesh.

The “pus” referred to here is not entirely inflammatory exudate from infection. *Ling Shu-Yong Ju* states: “When heat is exuberant, the flesh rots; when the flesh rots, it becomes pus,” indicating that pus is the product of heat steaming and brewing the flesh, arising from harmonized *qi* and blood. In TCM surgery, the concept of pus is broad: it includes not only the pus from sores and ulcers that requires timely incision and drainage, but also the inflammatory exudate in the later ulcerative stage after necrotic tissue sloughs off and in the early healing stage, as well as the “pus of harmonized *qi* and blood” that seeps from the wound in the middle-to-late healing phase. *Complete Collection of External Medicine* notes: “Toxin transformation must occur through pus; pus formation must arise from *qi* and blood.” This indicates that the pus generated in the simmering pus and growing flesh method is also a product of the body’s *qi* and blood. Furthermore, *Essential Points of External Medicine* states: “Generally, the rise and closure of sores are all driven by blood and *qi*,” highlighting the importance of *qi* and blood in wound closure. Therefore, clinical practice emphasizes “drug-wound interaction,” in which “pus,” belonging to the category of “body fluids,” acts as a medium. During the process of drug-induced pus generation, the drug and wound surface interact to promote active wound healing.

2. Multidimensional Mechanisms of “Simmering Pus and Growing Flesh” in Promoting Wound Healing

2.1. TCM Theoretical Mechanism: Drug-Wound Interaction Leading to Pus Generation and Tissue Growth

External therapies guided by the “simmering pus and growing flesh” theory follow the treatment principle of “drawing out pus and removing putridity → simmering pus and growing flesh → generating flesh and closing the wound.” In the initial stage, “drawing out pus and removing putridity” aims to expel accumulated pus and toxin from the sore, rapidly slough off necrotic tissue, and transform putridity into pus. In the middle stage, “simmering pus and growing flesh” shifts to drug-wound interaction [2], transforming “pus” into qi and blood, thereby improving local blood circulation at the wound, liquefying and expelling pus and necrotic material, and promoting new flesh growth. The “pus” simmered out by applying “simmering pus and growing flesh” herbal ointments to the local wound surface is the medium of drug-wound interaction. At this stage, the “pus” contains abundant essential substances derived from qi and blood. As stated, “Yang transforms into qi, yin forms into shape.” This “pus” not only promotes the release of active drug components, restores qi and blood, and enables pus generation and flesh growth, but also allows wound regenerative cells to absorb the active ingredients from the pus and continuously produce “pus,” forming a positive feedback loop that promotes granulation tissue growth and accelerates wound healing. In the later stage, the entire process of “generating flesh and closing the wound” embodies the TCM therapeutic principle of “eliminating evil without damaging the righteous, supporting the righteous without retaining evil,” ultimately restoring yin-yang balance at the wound site.

2.2. Modern Medical Theoretical Mechanisms: Improvement of the Wound Microenvironment

2.2.1. Regulation of Immune Response

The main cause of impaired wound healing after trauma is persistent inflammatory response. Zhu Chaojun et al. found [3] that the “simmering pus and growing flesh” method can early inhibit iNOS expression induced by M1-type macrophages, subsequently promote increased expression of the M2-type macrophage phenotypic marker Arg-1, accelerate the phenotypic transformation of M1 to M2 macrophages, and thereby create a favorable anti-inflammatory microenvironment for tissue repair.

2.2.2. Supplementation of Wound Nutrition

The representative flesh-generating drug in Shengji Xiangpi Ointment contains calamine, which has the effects of astringing dampness, relieving itching, and closing sores. Its main component is zinc carbonate (ZnCO_3), which after processing is converted into the active component zinc oxide (ZnO). Zinc plays a critical role in wound healing; zinc deficiency can delay wound healing [4]. Zinc supplementation inhibits the expression of inducible nitric oxide synthase and plays important roles in antioxidation, regulation of extracellular matrix (ECM) deposition and fibrosis, and promotion of granulation tissue formation. Moreover, elephant hide (Xiangpi) contains trace elements such as copper, iron, and zinc, as well as various vitamins and proteins, all of which constitute the foundation for promoting wound healing and flesh generation.

2.2.3. Promotion of Neovascularization

The formation of new blood vessels is the basis for granulation tissue growth. Studies have confirmed that “simmering pus and growing flesh” herbal medicines can significantly increase the content of various endogenous growth factors such as epidermal growth factor (EGF), fibronectin (FN), hyaluronidase (HA), and amino acids such as glycine at the wound surface, enhance microvascular permeability, increase the proportion of type III collagen, thereby stimulating neovascularization, improving local blood circulation, and promoting rapid granulation tissue growth [5]. This is equivalent to creating new blood supply channels locally at the wound, improving microcirculation, supplying adequate oxygen and nutrients for tissue repair, accelerating wound healing, and reducing scar formation.

2.2.4. Regulation of Wound Acid-Base Environment

Drugs exhibit better solubility in a moist environment. Studies have found that, compared with non-ionic solutions, drug solubility increases most significantly when the solution pH is 5, with intrinsic solubility rising by up to 128 times. After treatment with the “simmering pus and growing flesh” method, the wound pH shifts from alkaline toward acidic. Research results also indicate that the transition of wound pH from alkaline to acidic is closely associated with improvement in wound condition [6]. The “simmering pus and growing flesh” method may enable the wound to act back on the drug, better enhancing its solubility and promoting the release of active components, thereby further facilitating wound healing.

2.2.5. Protection of the Moist Wound Environment

Illuminating the Mysteries of External Medicine points out that the “simmering pus and growing flesh” method has the functions of securing the exterior, astringing the sore, and preventing re-invasion by external evil, thereby protecting the wound surface. Once putrid evil has been expelled, the wound is exposed and the skin is broken; without protection, it easily becomes an entry point for bacteria and leads to secondary infection. The ointment base forms a protective film over the wound, maintaining a moist, low-oxygen, constant-temperature physical environment. This prevents crust formation, avoids epidermal cell migration around the crust, reduces pain, and preserves the vitality of periwound skin tissue. In addition, the “simmering pus and growing flesh” method can prevent dressing adhesion to the wound, pus accumulation under the crust, and poor drainage, which would cause secondary wound damage.

2.2.6. Promotion of Granulation Tissue Growth

When “simmering pus and growing flesh” herbal medicines are applied to the wound surface, the production of pus is accompanied by the formation of new granulation tissue. Studies have shown that the hydrophilic fraction of the water extract of *Angelica sinensis*, a commonly used flesh-generating drug, significantly stimulates endothelial cells and promotes proliferation of human dermal fibroblasts and secretion of type I collagen, thereby promoting granulation tissue growth. Vascular endothelial growth factor (VEGF) plays a key role in angiogenesis; its deficiency delays wound healing. Experiments suggest [7] that “simmering pus and growing flesh” can increase VEGF content in wound secretions and regulate VEGF/Notch1/TGF- β 1 expression in granulation tissue, thereby promoting granulation growth.

3. Clinical Applications of TCM Preparations Based on the “Simmering Pus and Growing Flesh” Theory

3.1. Promotion of Granulation Tissue Growth

The TCM concept of “holism” holds that a wound is not merely a local injury but also a manifestation of overall *qi* and blood. Therefore, the “simmering” in “simmering pus and growing flesh” not only bears the responsibility of protecting exposed flesh but also serves as an external manifestation of internal supplementation and support of the interior, with smooth flow of *qi* and blood.

Under the guidance of the “simmering pus and growing flesh” theory, a series of highly effective TCM external preparations have been developed and demonstrate remarkable efficacy in the clinical management of various wounds. Representative classical ointments include Xiangpi Ointment, Taiyi Ointment, Shengji Yuhong Ointment, Shengji Powder, Shixiang Ointment, and Zhengyang Ointment. Different preparations are applied according to the different stages and syndromes of wound healing: in the initial stage when necrotic tissue has not yet sloughed off, Taiyi Ointment, frankincense, myrrh, and dragon’s blood are used to invigorate blood, resolve stasis, reduce swelling, and primarily draw out pus and remove putridity; in the middle stage when pus and putridity are nearly exhausted but new flesh has not yet grown, Shengji Yuhong Ointment or Simmering Pus and Growing Flesh Ointment are selected to achieve simmering pus and growing flesh, while adding pearl powder and calamine to astringe the sore and using pig skin or elephant hide to generate flesh; in the later stage of flesh generation and wound closure, Shengji Powder and similar preparations are appropriate.

3.2. Typical Clinical Cases and Syndrome Differentiation Treatment

3.2.1. Medical Case Illustration

The patient, a 78-year-old male, had a 20-year history of “type 2 diabetes” and was taking Diamicon and Glucophage orally, with reportedly fair blood glucose control. He presented with worsening coldness and numbness in the right lower limb for over 8 months and black necrosis of the 4th and 5th toes of the right foot for 5 months. Self-application of antibacterial ointment produced no obvious improvement, so he sought treatment at our hospital.

On admission, the patient had black necrosis of the 4th and 5th toes of the right foot accompanied by redness, swelling, and pain of the right foot, coldness and numbness in both lower limbs (more severe on the right), poor appetite, epigastric distension, unsmooth defecation, frequent nocturia, and poor sleep. Specialized examination: dry black necrosis of the 4th and 5th toes of the right foot, ulceration at the toe bases with gray-yellow degenerative necrotic fascial tissue; probing with forceps revealed a cavity approximately 2-3 cm deep containing abundant necrotic tissue, with obvious tenderness; the skin around the ulcer was dark red and swollen, extending to the sole and dorsum of the foot; the 3rd toe of the right foot was purplish and swollen; the 5th toe of the left foot was absent with an old scar; skin temperature of both feet was decreased; dorsalis pedis artery pulsation was weakened bilaterally. Tongue: pale, dark, and enlarged with tooth marks, faint ecchymosis, yellow thick greasy coating at the middle-root, and

sublingual varices. Pulse: wiry and thready. Laboratory tests: neutrophil percentage 78.4%, lymphocyte percentage 14.2%, RBC $3.17 \times 10^{12}/L$, Hb 91 g/L, hematocrit 28.2%; CRP 35.59 mg/L; blood glucose 6.97 mmol/L; HbA1c 6.9%. Lower limb CTA: arteriosclerosis and occlusion of both lower limbs; restenosis of stent in the right femoral artery; restenosis of stent in the left tibiofibular trunk. Lower limb arterial ultrasound: decreased blood flow velocity in both dorsalis pedis arteries; intimal thickening of bilateral femoral and popliteal arteries; soft plaque formation in bilateral dorsalis pedis arteries; soft plaque at the right femoral artery bifurcation; hard plaque in the left femoral artery; mixed plaques in bilateral popliteal arteries. Western medicine diagnosis: diabetic foot of the right foot (gangrene stage), lower limb occlusive arteriosclerosis. TCM diagnosis: gangrene (damp-heat and blood stasis obstruction syndrome).

After admission, the patient underwent debridement and drainage of the diabetic foot gangrene of the right foot and amputation of the 3rd, 4th, and 5th toes of the right foot. Postoperatively, Maixuekang powder was sprinkled externally, Baikerui gauze was used for packing, and Jinhuang Ointment was applied topically. Internally, Sanmiao Pill combined with Bixie Shenshi Decoction was administered (modified), one dose daily, decocted to 300 mL and taken warm in two divided doses. Intravenous Kashi and plasmin injection were given to improve lower limb circulation; subcutaneous heparin was administered for anticoagulation; metronidazole and ceftazidime were given intravenously for infection control; and Glucophage and Diamicron were continued for blood glucose control. After 24 days of treatment, pain at the right foot stump had improved, coldness and numbness in both lower limbs had lessened, appetite had improved, epigastric distension had resolved, defecation was smooth, nocturia frequency decreased, and sleep had improved. The prescription was then changed to Buyang Huanwu Decoction combined with Liu Junzi Decoction and Liuwei Dihuang Pill (modified), one dose daily. Externally, Maixuekang and Shengji Powder were sprinkled, Baikerui gauze was used for packing, and Longzhu Ointment was applied to invigorate blood and generate flesh, combined with “Shengji Lianchuang Formula” herbal steam bath. The remaining treatment followed the original plan. After two months of treatment, the right foot stump wound had obviously shrunk and become shallower (approximately $1.2 \text{ cm} \times 3 \text{ cm}$), with pale red granulation tissue, minimal clear exudate, no obvious redness or swelling around the wound; skin temperature of both feet had increased, and dorsalis pedis artery pulsation had returned to normal. The therapeutic effect was remarkable.

3.3. Modern Preparations and Clinical Applications

On this basis, modern clinical practice has developed various treatment modalities such as Chuangyu Ointment [8], Simmering Pus and Growing Flesh Ointment [9], Shengji Xiangpi Ointment [10], Moist Burn Ointment [11], Fuhuang Shengji Yuchuang Ointment [12], and TCM hot compress packs [13], which are widely used for diabetic foot ulcers, pressure injuries, chronic refractory wounds, chronic lower limb ulcers, and postoperative wounds after anal fistula surgery, among others. For example, Xu Jienan et al. applied the “simmering pus and growing flesh moist” therapy to 132 patients with chronic lower limb ulcers [12], primarily using topical Fuhuang Shengji Yuchuang Ointment for its effects of invigorating blood, resolving stasis, tonifying

deficiency, supporting the righteous, simmering pus and growing flesh, and moistening and astringing the sore. Shengji Powder was sprinkled internally, and Hongyou Ointment gauze was applied externally to assist flesh generation and wound closure while maintaining prolonged moisture of the Fuhuang Shengji Yuchuang Ointment gauze to enhance the simmering pus and growing flesh effect. Concurrently, addressing the root pathogenesis of “deficiency” and “stasis” in chronic skin ulcers, internal administration of herbs to tonify the righteous, resolve stasis, harmonize the nutritive level, and support toxin expulsion and flesh generation was combined with external treatment, achieving supplementation of deficiency and resolution of stasis through internal-external integration.

Notably, modern research has shown that TCM external preparations represented by Jinchuang Ointment can enhance the viability and migration ability of human skin fibroblasts by activating the EGFR and FAK/Src pathways while inhibiting the NF- κ B and MAPK signaling pathways in macrophages, thereby reducing the secretion of pro-inflammatory factors such as TNF- α and IL-6, and exerting dual effects of promoting wound healing and anti-inflammation. This provides new experimental evidence for the modern scientific connotation of the “simmering pus and growing flesh” method.

4. Conclusions

4.1. Research Summary and Theoretical Innovation

This paper systematically reviews the historical origins, TCM mechanisms, and modern scientific connotations of the “simmering pus and growing flesh” theory, clarifying that the theory accelerates wound healing through multi-pathway synergistic actions including immune regulation, promotion of angiogenesis, supplementation of wound nutrition, regulation of acid-base environment, protection of the moist environment, and promotion of granulation tissue growth. The study demonstrates that the “pus” emphasized in the “simmering pus and growing flesh” method is not merely a pathological product but a reparative medium arising from the harmonization of *qi* and blood and drug-wound interaction, embodying the TCM concepts of “holism” and “yin-yang harmony.” It breaks through the limitations of the traditional Western medical concept of sterile and dry wounds. By systematically integrating the TCM mechanisms of the “simmering pus and growing flesh” theory with multi-angle modern scientific evidence, this paper constructs a complete discourse framework from theoretical tracing and mechanistic elucidation to clinical application, and through analysis of typical cases, demonstrates the practical value of the theory in syndrome differentiation treatment.

4.2. Research Limitations and Future Prospects

At present, research based on the “simmering pus and growing flesh” theory still has many deficiencies. First, clinical studies are predominantly experiential observations and small-sample case reports, lacking support from large-sample, multicenter, randomized controlled trials. Second, mechanistic studies mostly remain at the level of phenomenological description; the microscopic composition, dynamic changes, and interaction mechanisms between “pus” and drug components are still unclear. Third, preparation quality control standards are not unified, drug components are complex, and action targets are difficult to precisely

locate, affecting the stability and reproducibility of efficacy. Fourth, integration with new biomaterial technologies is still in its infancy.

To address these issues, future research can be deepened in the following directions: (1) strengthening basic research by using omics technologies to analyze the proteomic and metabolomic characteristics of “pus” during the “simmering pus and growing flesh” process and to elucidate the key active molecules responsible for repair; (2) promoting modernization of preparations by developing biomimetic dressings based on the “simmering pus and growing flesh” theory to achieve spatiotemporal controlled release of drugs; (3) conducting high-quality clinical studies, establishing unified efficacy evaluation systems and clinical pathways, and elevating the level of evidence; and (4) exploring synergistic applications with modern wound treatment technologies to leverage the advantages of integrated Chinese and Western medicine. For example, the study by Han Tiantian et al. [14] showed that vacuum sealing drainage (VSD) combined with external application of Shengji Powder accelerates healing of diabetic foot infectious ulcers. Similarly, research by Fan Yu, Su Yujuan et al. [15] indicated that perfusion-retained-negative pressure therapy with a blood-activating and flesh-generating formula, using NPWTi-d technology, allows uniform infiltration of the herbal liquid into the wound area, better exerting its antibacterial, blood-activating, *qi*-moving, stasis-resolving, and flesh-generating effects. Through multidisciplinary integration, the modernization and clinical translation of the traditional “simmering pus and growing flesh” theory can be advanced, enabling this theory to better serve the treatment of chronic refractory wounds, alleviate patient suffering, shorten treatment cycles, and enhance the societal recognition of TCM surgical therapies.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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