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Application of Silk Fibroin Dressing in Wound Repair after Laser Surgery

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Abstract: This article observes the clinical effect and safety of silk fibroin dressing for wound healing of atrophic acne scars after CO2 fractional laser. A total of 100 patients were randomly divided into an observation group and a control group, with 50 cases in each group. After the laser surgery, the observation group used silk fibroin dressing (Fuxiang Sitai Medical Technology), and the control group used hyaluronic acid (HA) dressing. The indications of these two dressings are non-chronic wounds, including suture wounds after surgery and lasersurgery. The wound healing times were recorded. The results showed that the scab forming time (1.76±0.55 days vs 2.79±0.58 days), scab peeling time (4.35±0.66 days vs 6.31±1.24 days), and total wound healing time (3.51±0.52 days vs 5.18 ± 0.77 days) in the observation group were significantly shorter than those in the control group ($P<0.05$). At the same time, the Visual Analog Scale (VAS) pain score (1.24 ± 0.67 vs 3.54 ± 0.54) and Vancouver Scar Scale (VSS) score (5.31 ± 0.68 vs 8.63 ± 0.93) in the observation group were significantly lower than the control group ($P<0.05$). The adverse reaction rate in the observation group was 6.00% (3/50), which was significantly lower than 18.00% (9/50) in the control group ($x2=10.733$, $P<0.01$). In conclusion, the application of silk fibroin dressing can speed up tissue healing, reduce pain, improve scars, and lower the adverse reaction rate after CO2 fractional laser surgery.

1. Introduction

Severe acne easily leaves atrophic scars on the face. It brings a great influence to the facial beauty and psychological health of the patients. At present, CO2 fractional laser is widely used in clinical treatment. The laser uses focal photothermolysis to create microscopic treatment zones. This can stimulate dermal fibroblasts and produce new collagen [1]. However, the high thermal energy damages the normal skin barrier. It causes an acute local inflammatory response. After the surgery, patients often experience skin redness, swelling, burning pain, and long-term scabs [2].

Early wound care is very important for the final cosmetic outcome. Good nursing care can speed up skin re-epithelialization and prevent complications, such as post-inflammatory hyperpigmentation (PIH) and persistent redness. In normal clinical practice, doctors give patients hyaluronic acid (HA) dressings. HA can give water to the skin and keep the wound moist. But HA is only a passive water-retaining agent. It cannot actively reduce inflammation or provide a biological scaffold to help cell growth [3].

So, more and more people pay attention to new biological materials. Silk fibroin is a kind of natural protein. It is extracted from silkworm cocoons. It has good biocompatibility and low immunogenicity. Its structural proteins are very close to human skin proteins. Recent studies show that the special amino acids in silk fibroin can promote fibroblast migration, reduce inflammatory factors, and improve the wound healing microenvironment [4].

Based on the above, our study compares silk fibroin dressing with HA dressing. We aim to observe the clinical effect and safety of silk fibroin dressing for patients after CO2 fractional laser.

2. Materials and Methods

2.1 Cohort Characteristics

We selected 100 patients with facial atrophic acne scars who received ablative fractional resurfacing in our dermatology department between 2022 and 2024. We used a random number table method to divide the patients into an observation group (n=50) and a control group (n=50). We compared the baseline data between the two groups. The age, gender, and disease duration of the two groups had no statistically significant differences (P>0.05). The two groups were comparable.

2.1.1 Inclusion Criteria

Diagnosis of atrophic acne scars;
Indicated for CO2 fractional laser treatment;
No allergy to silk fibroin or hyaluronic acid.

2.1.2 Exclusion Criteria

Local skin infection or active viral infection;
History of keloids or scar constitution;
Recent use of photosensitive drugs;
Pregnant or lactating women.

2.2 Treatment Methods

2.2.1 Laser Treatment

Both groups received standard ultra-pulsed CO2 fractional laser treatment. The parameters were as follows:

Wavelength: 10,600 nm
Pulse energy: 10–160 mJ
Spot spacing: 0.3–0.9 mm
Coverage: 10%–25%

2.2.2 Post-operative Care

(1) Control Group: Hyaluronic acid dressing was applied immediately after laser surgery, 2 times a day, for continuous 14 days.

(2) Observation Group: Silk fibroin dressing (Fuxiang Sitai Medical Technology (Suzhou) Co., Ltd.; Registration No.: Su Xie Zhu Zhun 20242142377) was applied immediately after laser surgery, 2 times a day, for continuous 14 days.

2.3 Observation Indicators

2.3.1 Wound Healing Time

Recorded the scab forming time, scab peeling time, and total wound healing time.

2.3.2 Pain Assessment

Used the Visual Analogue Scale (VAS, 0–10 points) to evaluate pain. A higher score means worse pain.

2.3.3 Scar Assessment

Used the Vancouver Scar Scale (VSS) to evaluate the scar. It includes pigmentation, blood vessels, softness, and thickness.

2.3.4 Adverse Reactions

Observed the occurrence of prolonged redness, severe swelling, and pigmentation after the surgery.

2.4 Statistical Analysis

SPSS 27.0 software was used for statistical analysis. Measurement data were expressed as mean ± standard deviation ($\bar{x}$±s) and analyzed by the independent sample t-test. Count data were expressed as percentages (%) and analyzed by the chi-square (x^2) test. $P < 0.05$ meant the difference was statistically significant.

3. Results

3.1 Comparison of Wound Healing Times

The scab forming time, scab peeling time, and total wound healing time in the observation group were significantly shorter than those in the control group. The differences were statistically significant (P<0.05). See Table 1.

Table 1. Comparison of Wound Healing Times between the Two Groups ($\bar{x}$±s, days)

Group	n	Scab Forming Time	Scab Peeling Time	Wound Healing Time
Observation	50	1.76 ± 0.55	4.35 ± 0.66	3.51 ± 0.52
Control	50	2.79 ± 0.58	6.31 ± 1.24	5.18 ± 0.77
t value	—	9.112	9.894	12.741
P value	—	< 0.05	< 0.05	< 0.05

3.2 Comparison of Pain and Scar Scores

After treatment, the VAS score and VSS score in the observation group were significantly lower than those in the control group. The differences were statistically significant ($P < 0.05$). See Table 2.

Table 2. Comparison of Pain and Scar Scores between the Two Groups ($\bar{x}$±s, points)

Group	*n*	VAS Score	VSS Scar Score
Observation	50	1.24 ±0.67	5.31 ±0.68
Control	50	3.54 ±0.54	8.63 ±0.93
t value	—	19.015	20.364
P value	—	< 0.05	< 0.05

3.3 Comparison of Adverse Reactions

The observation group had 3 cases of adverse reactions, and the incidence rate was 6.00%. The control group had 9 cases, and the incidence rate was 18.00%. The adverse reaction rate in the observation group was significantly lower than that in the control group ($\chi 2 = 10.733$, $P < 0.01$). See Table 3.

Table 3 Comparison of Adverse Reactions between the Two Groups [n (%)]

Group	*n*	Adverse Events (Cases)	Incidence Rate (%)
Observation	50	3	6
Control	50	9	18
x^2value	—	—	10.733
P value	—	—	< 0.01

4. Discussion

CO2 fractional laser works by creating small thermal treatment zones in the skin. It destroys scar tissue and rebuilds the dermis. Although the clinical effect is good, the laser damages the epidermis and causes an acute inflammatory response [5]. Therefore, early and effective wound care is very important to shorten the recovery time and prevent bad scars.

Traditional post-operative care usually uses hyaluronic acid dressings to keep the wound moist. However, hyaluronic acid is only a passive moisturizing dressing. It cannot actively promote cell growth or rebuild the extracellular matrix (ECM).

In contrast, silk fibroin is a bioactive material. Its structure is very similar to human collagen, so it can integrate into the wound microenvironment very well [6]. In this study, the scab forming time (1.76±0.55 days) and wound healing time (3.51±0.52 days) in the observation group were significantly shorter. This shows that silk fibroin can act as a biological scaffold to help keratinocytes migrate and fibroblasts grow.

At the same time, the VAS score (1.24±0.67) and VSS score (5.31±0.68) in the observation group were significantly reduced. The pain relief effect of silk fibroin may be because it forms a biological protective film on the wound. This film reduces external stimulation to nerve endings and reduces inflammation. Furthermore, it regulates collagen growth and prevents disordered collagen accumulation, which improves the scar texture.

The incidence of adverse reactions in the silk fibroin group was only 6.00%, which was much lower than 18.00% in the control group. This further proves that the material has excellent safety and biocompatibility.

In conclusion, the application of silk fibroin dressing after CO2 fractional laser surgery is better than traditional hyaluronic acid dressing. It can speed up wound healing, relieve pain, improve scars, and reduce adverse reactions. It is worthy of wide application in clinical practice.

References

[1] Zhang J, Xu F, Lin H, et al. Efficacy of fractional CO2 laser therapy combined with hyaluronic acid dressing for treating facial atrophic acne scars: a systematic review and meta-analysis of randomized controlled trials[J]. Lasers in medical science, 2023, 38(1): 214.

[2] Liu F, Zhou Q, Tao M, et al. Efficacy and safety of CO2 fractional laser versus Er: YAG fractional laser in the treatment of atrophic acne scar: A meta-analysis and systematic review[J]. Journal of Cosmetic Dermatology, 2024, 23(9): 2768-2778.

[3] Ding Y W, Wang Z Y, Ren Z W, et al. Advances in modified hyaluronic acid-based hydrogels for skin wound healing[J]. Biomaterials science, 2022, 10(13): 3393-3409.

[4] Mazurek Ł, Szudzik M, Rybka M, et al. Silk fibroin biomaterials and their beneficial role in skin wound healing[J]. Biomolecules, 2022, 12(12): 1852.

[5] Liu X, Chen K, Zhao X, et al. Current research status and progress of laser therapy in wound healing[J]. Plastic and Aesthetic Research, 2026, 13: 10.

[6] Rodrigues M, Ayala-Cortés A S. Post-inflammatory hyperpigmentation[M]//Pigmentary Skin Disorders. Cham: Springer International Publishing, 2018: 197-208.