Efficacy Observation of Silk Fibroin Dressing in Patients after Facial Laser Surgery

Fang Yiming, Li Ya, Zheng Wei Ming, Wu Meng*
First People's Hospital of Guiyang,Guiyang, Guizhou,China
**Corresponding Author*

Abstract: To observe the clinical effect and safety of silk fibroin dressing for patients after Q-switched laser treatment for facial freckles. A total of 82 patients with facial freckles were randomly divided into a treatment group (n=41) and a control group (n=41). After the Q-switched laser surgery, the treatment group used silk fibroin dressing (Fuxiang Sitai Medical Technology), and the control group used traditional ice compress. The results showed that the pain duration (3.88 ± 1.15 days vs 4.62 ± 0.82 days), erythema duration (5.83 ± 1.03 days vs 6.79 ± 0.93 days), and scab shedding time (6.97 ± 0.72 days vs 8.12 ± 0.99 days) in the treatment group were significantly shorter than those in the control group (P < 0.05). At the same time, the patient satisfaction rate in the treatment group was 97.56%, which was significantly higher than 78.05% in the control group (P < 0.05). The adverse reaction rate in the treatment group was 4.88%, which was significantly lower than 19.51% in the control group (x^2 = 8.607, P < 0.05). In conclusion, the application of silk fibroin dressing can speed up skin healing, reduce adverse reactions, and improve patient satisfaction after Q-switched laser surgery.

Keywords: Freckles; Q-switched Laser; Silk Fibroin Dressing; Post-operative Care; Efficacy

1. Introduction

Freckles are a common skin disease. They are usually small brown spots on the face and neck. They bring a great influence to the facial beauty and psychological health of the patients [1]. At present, the Q Max fractional Q-switched 532 nm laser is widely used to treat freckles in the clinic. It can destroy melanin cells effectively. However, the high laser energy damages the normal skin barrier. It causes an acute local inflammatory response. After the surgery, patients easily get skin redness, swelling, burning pain, and scabs [2]. If the wound is not treated well, it easily causes post-inflammatory hyperpigmentation (PIH) and long recovery time. Traditional post-operative care usually uses ice compress. Ice compress can lower the skin temperature and reduce pain. But it is only a physical cooling method. It cannot actively help cell growth or rebuild the skin barrier. So, more and more people pay attention to new biological materials. Silk fibroin is a kind of natural protein extracted from silkworm cocoons. It has good biocompatibility and no immunogenicity. Its structure is very close to human collagen. Recent studies show that silk fibroin can promote fibroblast growth, reduce inflammation, and keep the wound moist [3].

Based on the above, our study compares silk fibroin dressing with traditional ice compress. We aim to observe the clinical effect and safety of silk fibroin dressing for wound repair after Q-switched laser treatment for facial freckles.

2. Study Design and Methodology

2.1 General Information

We selected 82 patients with facial freckles who received Q-switched laser treatment in our hospital from 2024 to 2025. We randomly divided them into a treatment group (n=41) and a control group (n=41). The age and gender of the two groups had no statistically significant differences (P > 0.05). The two groups were comparable.

2.1.1 Inclusion Criteria:

Diagnosis of facial freckles;

No laser or chemical peeling treatments in the past 6 months;

Patients signed the informed consent form.

2.1.2 Exclusion Criteria:

History of keloids or scars;

Local skin infection or active viral infection;

Photosensitivity or recent use of photosensitive drugs.

2.2 Treatment Methods

All patients received Q Max fractional Q-switched laser treatment (Fotona, 532 nm wavelength). The parameters were as follows:
Pulse duration: 5-20 ns;
Spot size: 2-8 mm;
Energy: Adjusted based on the patient's skin condition.
Clinical endpoint: Immediate skin whitening with slight bleeding.

2.3 Post-operative Care

Both groups received care immediately after the laser surgery.
2.3.1 Treatment Group: Applied Silk Fibroin Dressing (Fuxiang Sitai Medical Technology Co., Ltd., Registration No.: 20242142377) Immediately for 30 Minutes. Then Patients Used It at Home Once a Day for 7 Continuous Days.
2.3.2 Control Group: Used Traditional Ice Compress Immediately for 30 Minutes.

2.4 Observation Indicators

① Wound Healing Time: Recorded the duration of pain, erythema duration, and scab shedding time.
② Patient Satisfaction: Evaluated as Very Satisfied, Satisfied, and Dissatisfied.
③ Adverse Reactions: Observed the occurrence of prolonged swelling, PIH, and infection.

2.5 Statistical Analysis

SPSS 26.0 software was used for statistical analysis. Measurement data were expressed as mean ± standard deviation ($\bar{x} \pm s$) and analyzed by the 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 pain duration, erythema duration, and scab shedding time in the treatment group were significantly shorter than those in the control group. The differences were statistically significant ($P < 0.05$). See Table 1.

3.2 Comparison of Patient Satisfaction

The patient satisfaction rate in the treatment group was 97.56% (40/41). The patient satisfaction rate in the control group was 78.05% (32/41). The satisfaction rate in the treatment group was significantly higher than that in the control group ($P < 0.05$). See Table 2.

Table 1. Comparison of Post-operative Recovery Indicators (X ±s)

Group	n	Pain Duration (d)	Erythema Duration (d)	Scab Shedding (d)
Treatment	41	**3.88 ± 1.15**	**5.83 ± 1.03**	**6.97 ± 0.72**
Control	41	**4.62 ± 0.82**	**6.79 ± 0.93**	**8.12 ± 0.99**
t value	-	3.4	4.4	6
P value	-	< 0.05	< 0.05	< 0.05

Table 2. Comparison of Patient Satisfaction [n (%)]

Group	n	Satisfied	Dissatisfied	Total Satisfaction Rate (%)
Treatment	41	40 (97.56)	1 (2.44)	98
Control	41	32 (78.05)	9 (21.95)	78
x^2 value	-	-	-	7.3
P value	-	-	-	< 0.05

3.3 Comparison of Adverse Reactions

The treatment group had 2 cases of adverse reactions, and the incidence rate was 4.88%. The control group had 8 cases, and the incidence rate was 19.51%. The adverse reaction rate in the treatment group was significantly lower than that in the control group ($\chi^2 = 8.607$, $P < 0.05$). No severe complications happened in the two groups. See Table 3.

Table 3. Comparison of Adverse Reactions [n (%)]

Group	n	Adverse Events (n)	Incidence (%)
Treatment	41	2	4.88
Control	41	8	19.51
x^2 value	-	-	8.607
P value	-	-	< 0.05

4. Discussion

Q-switched laser works by selective photothermolysis. It can break the melanin into small pieces [4]. Then the body clears the pieces. Although the laser is very effective, the high energy damages the skin barrier. It causes an acute inflammatory response. Patients experience skin redness, swelling, and pain after the surgery. Traditional post-operative care usually uses ice compress. Ice compress can only cool the skin and relieve pain. It cannot actively promote cell growth or reduce skin water loss [5].
Therefore, silk fibroin dressing is a better choice

for biological wound care. Silk fibroin can keep the wound moist and prevent nerve endings from external stimulation. Its amino acid structure is very similar to human proteins. It can promote fibroblast growth and collagen synthesis [6]. In our study, the pain duration (3.88 ± 1.15 days) and erythema duration (5.83 ± 1.03 days) in the treatment group were significantly shorter. This shows that silk fibroin can effectively reduce inflammatory factors and improve the wound microenvironment.

At the same time, the scab shedding time (6.97 ± 0.72 days) in the treatment group was also significantly shorter. Fast wound healing is very important. If the inflammation lasts too long, it easily causes post-inflammatory hyperpigmentation (PIH). Because silk fibroin shortens the healing time, it reduces the risk of PIH. The adverse reaction rate in the treatment group was only 4.88%, and the patient satisfaction rate was 97.56%. This further proves that silk fibroin dressing is safe and effective.

5. Conclusion

In conclusion, the application of silk fibroin dressing after Q-switched laser treatment for facial freckles is better than traditional ice compress. It can speed up wound healing, reduce adverse reactions, and improve patient satisfaction. It has high clinical application value.

References

[1] Liu L, Che Q, Zhou Z, et al. 730-nm, 532-nm and 694-nm laser in the treatment of freckles and solar lentigines (A randomized clinical trial)[J]. Lasers in Medical Science, 2025, 40(1): 309.

[2] Zheng H, Qiao G, Zhang Y. Treatment of Combined Freckles with Chloasma Using Q-Switched 1064 nm Laser[J]. International journal of clinical practice, 2023, 2023(1): 4081427.

[3] Liu B, Li Y, Chen H, et al. From molecular mechanisms to clinical translation: Silk fibroin-based biomaterials for next-generation wound healing[J]. International Journal of Biological Macromolecules, 2025, 313: 144266.

[4] Patel A D, Chopra R, Avram M, et al. Updates on lasers in dermatology[J]. Dermatologic Clinics, 2024, 42(1): 33-44.

[5] You C, Wang C, Ma Z, et al. Review on application of silk fibroin hydrogels in the management of wound healing[J]. International Journal of Biological Macromolecules, 2025, 298: 140082.

[6] Chen Z, Cheng J, Wang M, et al. In situ forming silk fibroin hydrogel dressing accelerates acute wound healing via immunomodulation and extracellular matrix regeneration[J]. Journal of Controlled Release, 2025: 114228.

