LASER TREATMENT OF SCARS: PRACTICAL ALGORITHMS

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Abstract

This article aims to present the main laser scar correction methods and their potential: how to choose the right laser scar correction method and the optimal combination of various methods for a certain kind of scar deformity?; can all scars be treated using laser correction?; treatment start dates; when there is a risk of pathological scarring recurrence and how to avoid it; when you should choose surgical correction; practical algorithms to help the physician performing laser scar correction.

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Introduction

A scar is a newly formed connective tissue that develops in place of deep skin defects involving the destruction of the dermis. Depending on the etiology, there are posttraumatic, postoperative and postinflammatory scars.

A patient seeking help of aesthetic medicine specialists always sees scar deformation as a defect that he/she wants to get rid of. A scar affects not only the appearance but also the psychological status of the patient, his/her social adaptation, the more so if it is located in the facial or any other visible area. Of course, our patients expect us to do wonders. We always ask them what we can do to help. We want them to understand that removing scar deformation completely is not possible at this time. Aesthetic correction only helps to reduce the severity of clinical symptoms of scar deformities allowing discomfort elimination and making the scar less noticeable.

There are many invasive and non-invasive scar correction methods (Table 1).

Non-invasive methods	Invasive methods
Well-known, scientifically sound and recommended methods	
Pressure/compression therapy	Intralesional administration of glucocorticosteroids
Silicone dressings and gels	Surgical scar correction
Experimental methods and methods with insufficient evidence	
Oils, lotions and creams	Laser therapy
Massage	Radiation therapy
Static and dynamic splints	Cryosurgery
Psychological counseling	Intralesional administration of other drugs
	Antihistamine drugs

Table 1. Overview of non-invasive and invasive scar treatment methods (1)

Laser scar correction has been used for several decades and during that time the methods and indications have undergone significant transformation. However, today's laser therapy belongs to the experimental methods with insufficient evidence (1) allowing achieving compelling aesthetic results in practice. Despite the need for more clinical data on the use of lasers, the specifics of selecting the required device and the treatment options/features, the growing number of publications on successful laser treatment of hypertrophic scars increases the interest in this treatment method (1). The relevance of further study of laser scar correction methods is obvious.

Laser scar therapy

Laser scar correction includes several methods based on various types of laser radiation (2-4). Every type of laser radiation affects a certain chromophore in tissues through various photobiological effects. Each laser method obviously has its own indications and results.

Laser scar correction methods include:

- laser coagulation of blood vessels;
- classical 3D laser ablation;
- fractional photothermolysis and
- laser removal of hyperpigmentation.

Laser scar correction has several advantages in comparison with other methods:

- the ability to perform complex scar treatment by combining several types of laser impact in a single treatment program and consistently applying them to the same scar to potentiate the correction effect;
- treatment of scars at any location, including in places with large functional load (for example, in the projection of the joints), which does not require restraints and refraining from habitual way of life, and does not cause considerable discomfort to the patient;
- the exact local impact of laser radiation with the ability to control its depth and
- the absence of significant systemic impact on the body allowing applying the methods in pediatric practice.

Still! You need to remember that laser therapy methods are aimed at reducing clinical manifestations and do not have significant results in reducing the scar area. For this reason, in some cases preference should be given to surgical correction by either refraining from laser methods completely or applying them after surgery. Such cases include:

- the possibility of scar excision and the creation of a smaller area of defect;
- repairing the scar with a skin flap with low risk of pathological scarring;
- moving the scar from an open area to a hidden area;
- removing scar adhesions with the underlying tissues that are causing the scar to retract; and
- the presence of a foreign body in the scar.

Given the wide variety of clinical scars, the treatment for a particular patient should be tailored to his/her individual needs (1). When choosing the tactic, you must also take into account the scar age and the maturity of scar tissue that can predict the result of the correction and the likelihood of relapse (2).

During the initial consultation, the physician should fully assess the clinical picture to determine the degree of severity of all scar signs in each case (Table 2). The clinical picture should be monitored and its dynamics should be tracked during corrective therapy.

Sign	Degree of severity
Subjective sensations in the scar area	• none • paresthesia • itching, from recurring to continuous • pain
Vascular component	• none — pale scar • minor — pale-pink scar • moderate — pink scar • pronounced — scar color from bright red to purple-blue
Scar tissue turgor	• reduced — flabbiness • normal — close to normal skin • increased — density above normal skin • significantly tense — tissues with cartilage-like density
Relief of tissues in relation to surrounding skin	• sunken tissue • on one level • moderate elevation — up to 0.5 cm • significant elevation — more than 0.5 cm
Pigmentation in the scar area	• de- and hypopigmentation • normal • hyperpigmentation

Table 2. Clinical signs of scars and their degree of severity

The array of all clinical signs, given their degree of severity, allows determining the scar type and its degree of maturity, which became the basis for the clinical and morphological classification that is the most useful in everyday medical practice from the practical point of view (Table 3).

Scar maturity degree	Typical clinical signs	Scar types
Immature scars	• visible dynamics of clinical picture in time • the trend towards increased scar tissue • high sensitivity to external influence • subjective sensation of varying severity in the scar area • the presence of vascular component (from red to purple-blue) • tissue density from normal to significantly increased • possible tissue surface tension with nacreous luster	• fresh scars less than 1 year old • hypertrophic scars up to 2 years old and small keloids* • large and multiple keloids
Mature scars	• stable clinical picture or slight changes (minimal, very slow, barely visible externally) • no trend towards increased scar tissue • vascular component is missing or weakly pronounced (pale or pale-pink) • tissue density is reduced, normal or moderately increased • no tissue surface tension • no subjective sensations in the scar area	• normotrophic scars • hypo- and atrophic scars • hypertrophic scars in regression (from two years old and older)

*Hypertrophic scars (1-2 years old) and smaller keloids are grouped together since their clinical differences are relative in nature. These scar types can only be reliably separated using histological examination or ultrasound, which is rarely used in everyday cosmetology practice.

Table 3. Clinical and morphological classification of scars

Clinical and morphological classification allows reasonably selecting the treatment tactic (the need of using a certain method or combining different methods, and the order in which they are used) and predicting the correction results.

The correction of immature scars always requires great vigilance and responsibility from the physician performing the correction procedure since the development of such scars is unpredictable due to their high sensitivity to external influence (including laser radiation) and probable risk of relapse (appearance) of pathological scarring.

There are more possibilities for scar correction when the degree of symptoms severity in the initial clinical picture is high. On the contrary, in case of low severity of all symptoms the scar correction possibilities are limited and the external result is less obvious. This should be taken into account in determining the validity of normotrophic scar therapy and during initial consultation with the patient in order to prevent high expectations.

Let's take a closer look at the laser scar correction methods, their mechanism of action, potential and indications.

Laser coagulation of blood vessels

The main laser types used for coagulation of blood vessels are:

- Nd:YAG/KTP neodymium double-frequency laser with 532 nm and 540 nm wavelength; and
- PDL pulsed dye laser with 575-595 nm wavelength.

Various types of hemoglobin are the main chromophore for this radiation type.

The laser causes photothermal effect aimed at coagulation of blood vessels.

The result is the removal of vascular component in the scar and its blanching. Reduced vascularization helps eliminate hyperemia of hypo- and atrophic scars, which improves their appearance. In the case of immature scars, the coagulation of blood vessels accelerates maturing of scar tissue by reducing the synthetic function of fibroblasts

(5, 6), which is clinically expressed not only in the removal of vascular component and tissue blanching but also in the disappearance of subjective sensations, the decrease of scar density and the reduction of its excess volume.

The exact mechanism of immature scarring improvement has not yet been determined. There are several theories, one of which involves local tissue ischemization with reduced nutrition, which reduces the functional activity of cells and the number of immature collagen matrix (5). Another theory, on the contrary, implies that the cause of the fibroblasts dysfunction is not a quantitative increase of vessels in an immature scar but rather their incapacity, which leads to tissue hypoxia. Normalization of microcirculation in the lesion supports stimulation of connective tissue maturation (6). In addition, this type of radiation increases the production of matrix metalloproteinases, including collagenases (15), which promotes the destruction of excess collagen.

The indications for using laser coagulation of blood vessels can be divided into two groups:

1. Immature scars:

- fresh scars with pronounced vascular component, tendency to hypertrophic growth, and the presence of subjective sensations (16);
- hypertrophic scars up to two years old and small keloids; and
- large and multiple keloids (in the complex therapy with other correction methods).

2. Mature scars with injected vessels and congestive vascular events.

Clinical example 1. Four sessions of laser coagulation of blood vessels using the ND:YAG/KTP 540 nm ("Multiline") laser as a hypertrophic scar monotherapy resulted in reduced hyperemia, density and volume of scar tissue (Fig. 1 A, B).

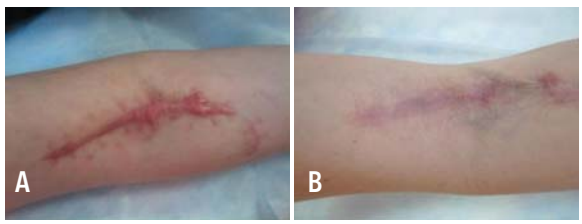

Figure 1. Hypertrophic scar before (A) and five months after (B) four sessions of laser coagulation of blood vessels

Clinical example 2. Completed three sessions of laser coagulation of blood vessels using the Nd:YAG/KTP 540 nm ("Multiline") laser as a monotherapy. The correction result is the optimization of color and external manifestations of scarring in general (Fig. 2 A, B).

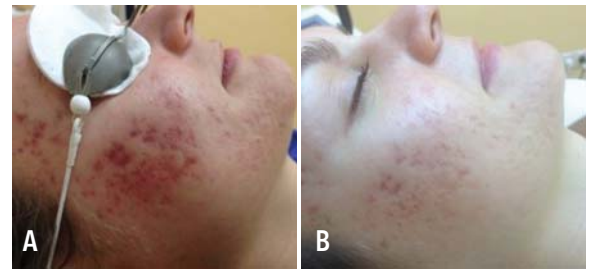

Figure 2. Atrophic post-acne scars with congestive vascular component before (A) and two months after (B) three sessions of laser coagulation of blood vessels

Laser ablation

The classical total laser ablation is performed using two lasers:

- Er:YAG erbium laser with 2,940 nm wavelength; and
- CO_2 laser with 10,600 nm wavelength.

Water is the main chromophore for middle and far infrared range radiation. The impact of such laser radiation causes the photothermal effect of ablation (*i.e.*, evaporation of tissue surface layers) due to the high rate of its absorption by water. This method is considered traumatic since it causes the formation of wound surface. The depth of ablation depends on the type of laser used, energy settings and the number of applications on the same site; it is selected individually and may vary in the treatment area with a view of targeted formation of surface relief.

The result is the smoothing of uneven relief between scar tissue and surrounding skin and the mild remodeling effect on connective tissue.

The indications for using laser ablation:

mature scars:

- hypo- and atrophic scars; and
- hypertrophic scars in regression (more than two years old).

Laser ablation is not used for immature scars due to the high risk of recurring pathological scarring.

Clinical example 3. One session of laser ablation using the Er:YAG 2,036 nm ("Multiline") laser as a monotherapy for atrophic post-acne scars

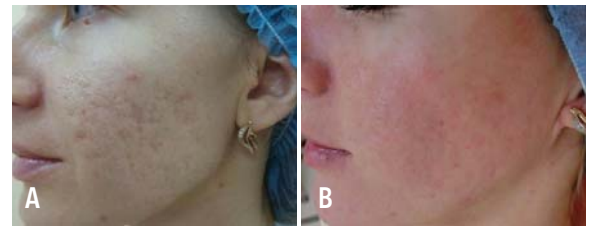

Figure 3. Atrophic post-acne scars before (A) and three months after (B) one session of laser ablation

yielded a positive result by reducing the scar depth (Fig. 3 A, B).

Clinical example 4. One session of laser ablation using the Er:YAG 2,036 nm ("Multiline") laser as a monotherapy for hypertrophic scar in regression resulted in a significant improvement in scar appearance by removing excess volume and leveling the relief (Fig. 4 A, B).

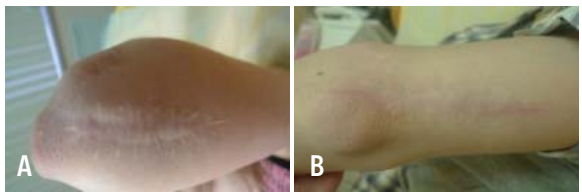

Figure 4. Hypertrophic scar in regression before (A) and three months after (B) one session of laser ablation

Fractional photothermolysis

The principle of fractional photothermolysis is the alternation of microdamage zones with intact tissue areas in the impact zone, thus reducing the invasiveness of the procedure and ensuring its effectiveness.

This is the most extensive group of methods that is notable for diverse types of laser radiation used and the characteristics of devices implementing this method.

All lasers in this group can be divided into two groups depending on the extent of the photothermal effect:

1. None-ablative lasers, whose photothermal effect causes coagulation of tissues in microdamage zones:

- ND:YAG neodymium laser with 1,320 nm wavelength;
- diode laser with 1,450 nm wavelength;
- Er:Glass erbium glass laser with 1,540 nm wavelength; and
- Thulium-fiber (1,927 nm).

2. Ablative lasers, whose photothermal effect causes tissue ablation in microdamage zones:

- Er:YAG erbium laser with 2,940 nm wavelength; and
- CO_2 laser with 10,600 nm wavelength.

Water is the chromophore in both cases. The leading mechanism is photothermal.

By itself, the concept of "fractional photothermolysis" does not say anything about the potential of this method. The result is determined by the type of laser radiation used and the basic parameters of its delivery to the impact zone that depends on the characteristics of a specific device.

The end result of fractional photothermolysis varies widely and depends on the choice and capabilities of a specific device.

The result of scar correction using fractional photothermolysis is determined by a number of physical parameters:

- the wavelength of radiation used, and, therefore, the nature of impact that is released in the damage microzone;
- the diameter of the damage microzone;
- the density of damage microzones at 1 cm^2;
- the percentage of total area coverage and so on.

The main effect is the reorganization of the scar tissue. Depending on energy parameters, this method allows achieving two goals:

- stimulation of collagen production; and
- destruction of excess collagen.

The impact on scar surface is realized indirectly by changing the tissue tone, which also helps improve the scar color and smooth its borders with normal skin.

The indications for using fractional photothermolysis vary just as the achieved effects and can be defined by the capabilities of a specific device. Some methods allow working with all kinds of scars.

Clinical example 5. Spatially modulated ablation using the Er:YAG 2,036 nm laser with SMA module ("Multiline"), energy density of 2,21 j/cm^2, for hypotrophic scar correction had a stimulating effect on neocollagenesis, which clinically manifested in timproved scar tissue tone and surface, and scar appearance in general (Fig. 5 A, B).

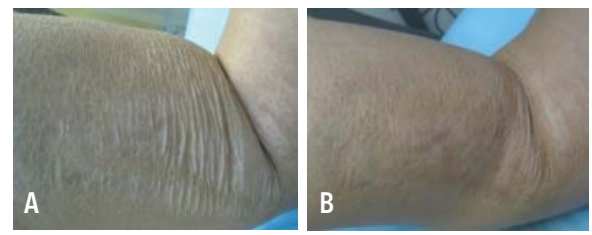

Figure 5. Hypotrophic scar before (A) and two months after (B) one session of spatially modulated ablation

Spatially modulated ablation (SMA method) is a special kind of impact that cannot even be completely identified with fractional methods.

A laser emission was spatially modulated with the help of a developed SMA module. As a result, the emission hits the tissue surface not in the form of a continuous wide spot, but as an ordered set of micro-spots 50 microns in diameter. The distance between micro-spots was also 50 microns. Unlike fractional methods, the leading mechanism that produces the effect of tissue remode-

ling is photomechanical, and not photothermal. When exposed to high-energy short laser pulse in zones with a high degree of damage, microablation areas start forming on the surface. These areas in turn are the source of mechanical waves' generation due to the rapid explosive expansion of tissues at their instant evaporation. Acoustic waves penetrate into deep layers where they interfere with waves coming from the neighboring microablation areas. The wave's amplitude grows and becomes sufficient for causing local mechanical microtraumas of cells and fibrous structures and launching the processes for restructuring connective tissue.

Clinical example 6. Spatially modulated ablation using the Er:YAG 2,036 nm laser with SMA module ("Multiline") and energy density of 2.21 j/cm^2 for the correction of a normotrophic scar. The result is the smoothing of scar borders (Fig. 6 A, B).

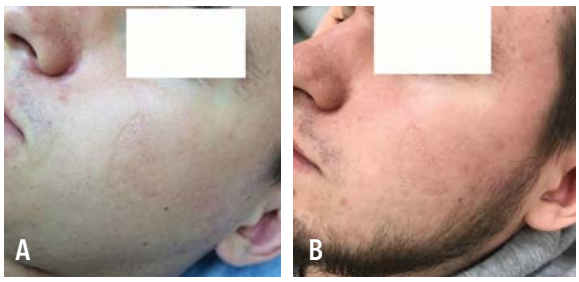

Figure 6. Normotrophic scar before (A) and six months after (B) one session of spatially modulated ablation

Clinical example 7. One session of spatially modulated ablation using the Er:YAG 2,036 nm laser with SMA module ("Multiline") and energy density of 3.9 j/cm^2 for the correction of a hypertrophic scar proved effective. The destructive effect on excess collagen clinically manifested in the decreased tone of the scar tissue, reducing excess scar and optimizing its surface and color (Fig. 7 A, B).

These examples demonstrate the wide potential of the method described above when using different parameters.

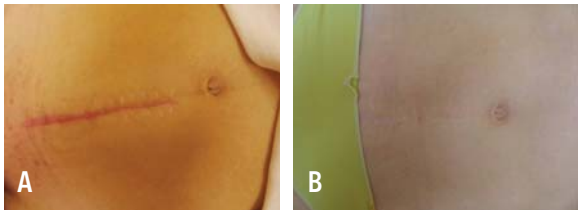

Figure 7. Hypertrophic scar before (A) and two months after (B) one session of spatially modulated ablation

Laser removal of hyperpigmentation

Laser removal of pigment is used for hyperpigmentation since hypopigmentation and depigmentation cannot be corrected using the existing laser methods.

The following is used to eliminate hyperpigmentation in the scar projection:

- Nd:YAG/KTP neodymium double-frequency laser with 532 nm and 540 nm wavelength;
- CVL copper vapor laser with 510 nm wavelength;
- Ruby/Qsw q-switched ruby laser with 694 nm wavelength;
- Alex/Qsw q-switched alexandrite laser with 755 nm wavelength.

Melanin is the main chromophore for these radiation types. The laser causes photomechanical or photothermal destruction of excess melanin, removes hyperpigmentation in the scar projection and aligns its color with that of the surrounding skin.

Indications: mature scars with hyperpigmentation.

Clinical example 8. Completed 1 session of pigment removal in the postoperative scar area using the Alex/Qsw laser with 755 nm wavelength ("Multiline"). Correction result is the alignment of the scar color with that of the surrounding skin (Fig. 8 A, B).

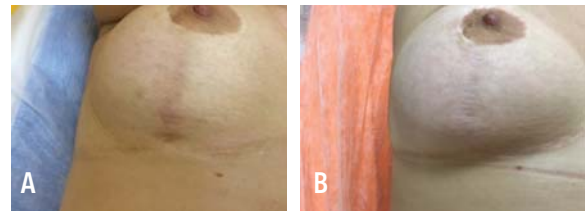

Figure 8. Normotrophic scar before (A) and one month after (B) one session of laser pigment removal

The possibilities of using different laser therapy methods depending on the scar type are presented in Tables 4 and 5.

A unified scar correction tactic does not exist. That is why the development of the fundamental principles governing the treatment strategy is of great practical importance.

Based on our extensive clinical experience, we have developed the steps for performing laser scar correction, which we are successfully using in practice (2-4, 8, 9).

Clinical examples of using the algorithm in practice:

Clinical example 9. The initial assessment of the clinical picture of the atrophic scar allowed identifying the leading symptom – surface rough-

Scar type	Clinical signs	Correction method	Expected outcome
Hypo- and atrophic scars	• relief — sunken tissue, lack of volume • tissue tone — reduced • congestive hyperemia • color — hypo- and depigmentation (not subject to correction)	Laser ablation	Relief smoothing
		Fractional photothermolysis	Increased tissue turgor and relief optimization
		Laser coagulation of blood vessels	Eliminating congestive hyperemia and optimizing color
		Laser removal of pigment	Removal of hyperpigmentation
Normotrophic scars	• modified tissue structure and surface — rugosity, smoothness • dyschromia — hypo-, de-, hyperpigmentation	Fractional photothermolysis	Tissue structure optimization, smoothing the borders between the scar and the healthy skin
		Laser removal of pigment	Removal of hyperpigmentation
Hypertrophic scar in regression (more than 2 years old)	• relief — elevation, excess volume • tissue tone — increased • slight hyperemia (residual vascular component)	Fractional photothermolysis	Reducing tissue density and scar volume
		Laser ablation	Removing excess scar tissue — relief smoothing
		Laser coagulation of blood vessels	Eliminating hyperemia and optimizing color

Table 4. The possibilities of using laser methods for correction of mature scars

Scar type	Clinical signs	Correction method	Expected outcome
Fresh scars (less than 1 year old)	• subjective sensations hyperemia • relief — possible roughness or scar tissue growth	Laser coagulation of blood vessels	Stimulating the maturity of connective tissue, eliminating subjective sensations and hyperemia
		Fractional photothermolysis	Suppression of excessive collagen production, smoothing the borders between the scar and the healthy skin
Hypertrophic scar (1-2 years old), small keloid	• subjective sensations hyperemia • tissue tone is significantly increased • relief — elevation, excess volume	Laser coagulation of blood vessels	Stimulating the maturity of connective tissue, eliminating subjective sensations, decreasing erythema, reducing tissue density, reducing scar volume, preventing relapse
		Fractional photothermolysis	Destruction of excess collagen — reducing tissue density and volume

Table 5. The possibilities of using laser methods for correction of immature scars

ness, accompanied by moderately expressed hyperemia. Completed complex serial laser correction: two sessions of laser ablation using the Er:YAG 2,036 nm ("Multiline") laser and one session of laser coagulation of blood vessels using the Nd:YAG/KTP 540 nm ("Multiline") laser. Treat-

Laser scar correction algorithm

Steps	Actions	Special tactics when correcting immature scars
Step 1	Evaluating the clinical picture and symptom severity, determining the scar type	
Step 2	Identifying the leading symptom in the total clinical picture	The presence of subjective sensations of any degree of severity is always considered the leading symptom (a marker for the risk of pathological scarring and relapse)
Step 3	Selecting the method of laser impact aimed at correcting the leading symptom, and assessing the impact of the selected radiation type on other clinical symptoms	In case of moderate and weakly expressed subjective sensations, the correction begins with the laser coagulation of blood vessels Pronounced subjective sensations require prior drug therapy
Step 4	Performing the procedures to obtain the desired effect	The absence of positive dynamics after two sessions or negative dynamics (subjective sensations, increased severity degree, increased scar tissue volume) is an indication for adding drug therapy to the treatment (local administration of glucocorticosteroids or enzymes)
Step 5	Repeated evaluation of the dynamic clinical picture and the severity of symptoms, selecting the next leading symptom	Regular dynamic inspections should take place at least once every two weeks, period which is associated with the instability of clinical picture and high sensitivity of scars to external impact factors, including laser radiation
Step 6	If necessary, switching to a different laser method aimed at correcting the next selected leading symptom	Switching to a different laser method is possible only after the complete relief of subjective sensations
Repeat steps 4-6 until achieving the optimum correction result		

ment course length was six months. The result is the optimization of scar color and relief; patient is satisfied (Fig. 9 A, B).

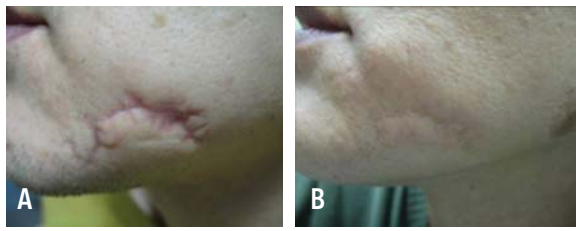

Figure 9. Atrophic scar before (A) and six months after (B) complex laser correction

Clinical example 10. The initial assessment of the clinical picture of a fresh scar with a tendency to hypertrophic growth allowed identifying the leading symptom – moderately expressed subjective sensations as paresthesia and transient itching. After one session of laser coagulation of blood vessels using the Nd:YAG/KTP 540 nm ("Multiline") laser, the subjective sensations disappeared completely, the severity of hyperemia reduced to moderate, and the scar tissue density decreased slightly. The next leading symptoms were uneven surface and increased tissue tone. To correct the symptoms, we completed two session of spatially modulated ablation using the Er:YAG 2,036 nm laser with SMA module ("Multiline"), with "destructive" energy parameters of 3.9 j/cm^2.

The result is aligning the surface, matching the scar color with that of the surrounding tissues, and removing excess tissue volume and density (Fig. 10 A, B). Treatment course length was 2.5 months. The patient is satisfied with the result.

Figure 10. Fresh scar with a tendency towards hypertrophic growth before (A) and two months after (B) complex laser correction

When to start the correction of fresh scars?

There is still no consensus on this issue among professionals. Some believe that the sooner you start interfering with the scar forming process the better aesthetic effect can be achieved as a correction result in order to prevent scar growth (17). Opponents argue that until the scar is stable, you cannot say what type of scarring it will follow – physiological or pathological – and that is why early intervention is risky and unwarranted.

We agree with the effectiveness of early correction and get good results.

Clinical example 11. Early postoperative scar correction on the 30th day after upper blepharoplasty – 1 session of spatially modulated ablation using the Er:YAG 2,036 nm laser with SMA module ("Multiline"), with "destructive" energy settings of 3.2 j/cm^2. Obtained a good result (Fig. 11 A, B).

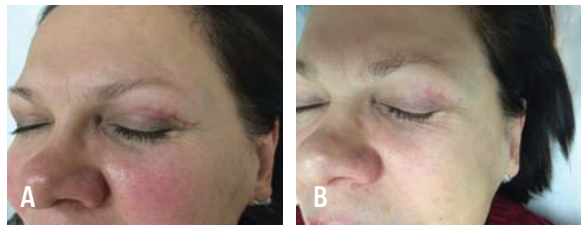

Figure 11. Fresh postoperative scar before (A) and two weeks after (B) early laser correction

Clinical example 12. Early correction of posttraumatic scar on the 28th day after trauma (Fig. 12 A, B). Completed 1 session of spatially modulated ablation using the Er:YAG 2,036 nm laser with SMA module ("Multiline"), with "destructive" energy settings of 3.2 j/cm^2. The result is positive.

Figure 12. Fresh posttraumatic scar before (A) and two weeks after (B) early laser correction

Clinical example 13. Early postoperative scar correction on the 28th day after laparotomy (Fig. 13 A, B). Completed 1 session of spatially modulated ablation using the Er:YAG 2,036 nm laser with SMA module ("Multiline"), with "stimulating" energy settings of 2.21 j/cm^2.

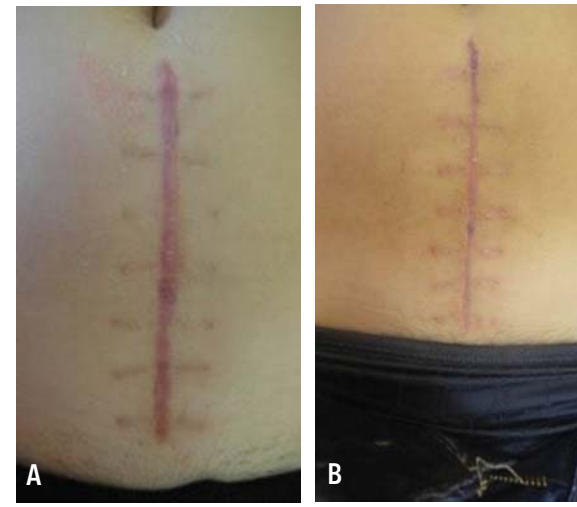

Figure 13. Fresh postoperative scar before (A) and five weeks after (B) early laser correction (negative dynamics)

Negative dynamics recorded after the procedure. The result is subjective sensations in the form of itching in the scar area, increased hyperemia, and increased width and volume of scar tissue.

The reasons for the negative dynamics after the laser therapy:

- incorrect energy settings that increase the functional activity of fibroblasts;
- late examination of the patient (more than one month after treatment); and
- belated therapy correction.

You need to remember that when correcting immature scars (including fresh scars), you need to use the utmost caution when evaluating all the risks and know how to minimize them, be reasonable when selecting the treatment tactic, timely and adequately monitor the dynamics and adjust therapy as needed. Immature scars should be treated by specialists with extensive experience.

Integrated approach to scar correction

Despite the broad potential and high efficiency of laser scar correction methods as monotherapy and combination of methods, there are several clinical situations when you need to add other methods:

- Intrascar corticosteroid injections – must precede laser therapy in cases of pronounced subjective sensations (intense itching, pain), progressive scar growth and large volume of scar tissue. Treatment can also be complemented by the administration of bleomycin, 5-fluorouracil and/or verapamil (optional) (10-12).
- Medicines for external use (silicone plaster, enzymatic gels) – can be used between sessions of laser therapy if the scar is in a constant

trauma zone and therefore poorly amenable to correction.

• Hyaluronic acid injections and PRP therapy allow achieving more pronounced results when combined with laser methods for correcting deep defects with significant relief depression.

The treatment of patients with large and multiple keloids requires a comprehensive approach. To be fair, it should be noted that such scars must be mainly treated by the surgeons in specialized clinics. If beauticians start treating such category of patients, they need to remember that such pathology involves the disturbance of the immunological and endocrine status (3, 14). That is why the patients must first undergo clinical laboratory examination and consultation with related professionals. Complex therapy should be used in case of any identified deviations.

Large and multiple keloids should be corrected in stages – on small areas (up to about 10 cm^2). After achieving a positive result in one area, you should start correcting the next area.

Conclusion

You always have to remember that laser therapy is administered in courses, the end results of correction are evaluated only after several months, and the effect build-up lasts up to a year. The optimal choice of therapeutic tactics ensures efficiency and minimizes risks. The more pronounced a degree of clinical changes of scar deformities is before treatment, the more possibilities for correction there are and the visual result from it is more significant. The less pronounced clinical symptoms are in the beginning, the less visible the changes are after the correction, and the visual result is less significant. Naturally, this may dissatisfy the patient. That is why such situation requires detailed discussion during the initial consultation with an explanation of therapy possibilities and an agreement on its necessity.

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