

Q-switched Ruby laser in the Treatment of Facial Epidermal Pigmented Dermatoses

Huang Yi, Huang Minghuan, Department of Dermatology, East Hospital, Shanghai, China

[Abstract]

Objective: To observe clinical changes in patients with facial epidermal pigmented dermatoses treated with Q-switched Ruby laser. **Methods:** 164 cases with ephelides, café au lait macules, lentiginos, seborrheic keratosis were treated by Q-switched Ruby laser. Treatment intervals were 3-6 months. **Results:** 122 cases were cured and 42 cases had marked effect after 1-2 times treatment. there was a marked therapeutic effect (74%) achieved. No scars appeared in all patients. **Conclusion:** Q-switched Ruby laser was secure and excellent in curing oriental facial epidermal pigmented dermatoses.

key words Q-switched Ruby laser facial epidermal pigmented dermatoses

Superficial pigmented dermatoses occurring on the face usually brings about adverse cosmetic effects. Previous treatment methods such as cryotherapy, electric cautery, CO₂ laser and radiofrequency have obvious side effects. We have treated 164 cases of ephelide, café au lait, lentiginos and seborrheic keratosis since 2002, having obtained satisfactory cosmetic results after more than 1 year of clinical observation.

1. Material and Methods

1.1 Clinical data:

164 (male 52, female 112) patients all came from outpatient department of dermatology, aged between 6 and 68 (average 32.6). Among them, are 32 cases of ephelides, 36 cases of café au lait, 23 cases of lentiginos and 73 cases seborrheic keratosis. The history of the lesions are ranged from 3 months to 50 years (average 11.5 years). 32 patients had 2 pigmentary disorders simultaneously, accounting for 19% of total cases, yet only the major disorder was evaluated.

1.2 Treatment:

Laser system: Q-switched Ruby laser (RubyStar⁺, Asclepion Laser Technologies GmbH, Germany) at 694nm was used for treatment, with the aiming beam at 635nm. The pulse width was 30ns, spot size adjustable from 3.5mm to 5.0mm, fluence adjustable from 3.4 to 13.0J/cm². The major parameters were listed in table1.

Procedure:

Table1 Major parameters used in treatment

disease	spot size [mm]	fluence [J/cm ²]	frequency
ephelide	3.5-5	3.4-7.3	single-continuous
café au lait	4-5	3.4-5.6	continuous
lentiginos	3.5-4	5.6-10.4	single
seborrheic keratosis	4-5	3.4-6.8	single-continuous

The areas to be treated were routinely cleaned and sterilized before treatment and some were photographed. Operators and patients all wore goggles for eye protection. Spot size and fluence were chosen according to skin tone, lesion size, degree of pigmentation, thickness and area to be treated and adjusted according to the immediate reaction during treatment. No anesthetics were used.

After the skin lesion was targeted with the aiming beam, footswitch was pressed and the lesion was irradiated by the emitted laser. Immediately after irradiation, there were grayish patches accompanied by slight pain at the irradiated area, afterwards edema and erythema appeared. There was also slight burning sensation that would disappear within 30 minutes. Ice pack was applied to large irradiated areas for 30 minutes to alleviate pain and burning sensation.

No medicine was administered after the operation, and the irradiated area was required to keep dry. Crust that was formed 1 day after operation would shed 7-14 days later. Regenerated epidermis was reddish in colour, and avoidance of sun exposure was required.

Follow-ups were carried out 3 and 6 months after treatment for evaluation of clinical response.

1.3 Evaluation of clinical response:

Clinical response was evaluated by both doctors and patients. "Cure" means complete clearance of pigment, "excellent" clearance >70%, "effective" clearance >50%. Cases cured after 2 treatments were evaluated as effective.

2. Results

122 of 164 patients were cured after 1 treatment and 42 were cured after 2 treatments. Cure rate after 1 treatment was 74%. Effective rate was 100%. Hyperpigmentation was still obvious 3 months after operation in 26 cases, diminishing gradually 6 months later. The longest time for diminishing of hyperpigmentation was 8.5 months after operation in 1 case. There was no hypopigmentation and scar formation in 164 cases.

Table 2 Clinical response

disease	Cure after treatment		effective rate %
	First (%)	Second (%)	
ephelide	27 (84.4)	5 (15.6)	100
café au lait	30 (83.3)	6 (16.7)	100
lentigines	13 (56.5)	10 (43.5)	100
seborrheic keratosis	52 (71.2)	21 (28.7)	100

3. Discussion

Superficial pigmentary dermatoses were selected for treatment, since pigmentation in these cases was distributed at the basal layer. Selectively destroyed by RubyStar at 694nm, melanocytes are vacuolated and fragmented. Cell debris is scavenged by macrophages and the pigmented lesion will disappear. It has been proved that dye laser, YAG laser and Ruby laser can be used for pigmentary skin disorder. The pulse width of these lasers is shorter than the thermal relaxation time (TRT) of melanosome, therefore most of epidermal cells are kept intact and regeneration of cells is made easy. There is no controversy over the treatment of pigmentary skin disorder with RubyStar, but there is more melanin in the skin of oriental people. 2 questions will arise concerning the treatment of them. The first concerns the selection of cases. Which has better response, light lesion or dark lesion? The second concerns the effect of skin tone on clinical response. The major objective of our observation is to make clear whether hypo- or hyperpigmentation will occur in the area treated with RubyStar.

According to our observation, the number of treatment depends on the distribution of pigment in the skin lesion. The more superficial the lesion, the less number of treatment. Generally speaking, only 1 treatment is required for superficial pigmentary skin disorder. The clinical response of ephelide is the best, whereas hypertrophic seborrheic keratosis is not suitable for RubyStar therapy.

The skin tone is an influencing factor of fluence chosen and prognosis, since the amount of melanin in melanocytes is dependent upon skin tone. However safe the Q-switched laser is, even slight injury is likely to cause hyperpigmentation which is dependent on the reaction of melanocytes to injury. Those dark skinned should be informed of possible delayed clearance of pigmentation. Appropriate fluence should be selected in order to prevent complete damage of epidermis by too high fluence. Delayed recovery is likely to cause prolonged hyperpigmentation.

Removal of crust too early, ultraviolet exposure and history of melasma are also risk factors of prolonged hyperpigmentation. Complete pigment clearance will take 6-9 months in dark skinned patients according to our observation. The next session of treatment can be started if there is no further pigment fading for more than 3 months.

For patients with slight melasma, observation for 6 months is required, and the second treatment too early is not recommended. Such principle is also applicable to pigmentary dermatoses at other sites. In our treated cases, there is no

hypopigmentation, depigmentation or scar formation.

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