### CASE REPORT: StarWalker VERDE for Treatment of Ephelides and Lentigo

**Chua Cheng Yu** Veritas Clinic, Singapore

#### ABSTRACT

Long-pulsed KTP is a modality usually used for treatment of superficial vascular lesions, but it has been used also for removal of epidermal pigmented lesions such as ephelides and lentigos.

Three female patients, aged from 32 to 46 years, had facial pigmented lesions removed for aesthetic reasons. The removal of lentigines and ephelides was performed in a single treatment session using long-pulsed 532 nm KTP (VERDE, StarWalker, Fotona, Slovenia).

All three patients showed almost complete clearance of the lesions, and patient who received full-face treatment, presented with improved skin texture and tone. There were no adverse effects observed.

Three cases presented in this report show that use of long-pulsed KTP is safe and effective for removal of epidermal pigmented lesions and improvement of skin tone and texture in patients with Fitzpatrick skin type III–IV.

**Key words:** StarWalker, VERDE, LP KTP, Pigmented Lesions, Ephelides, Lentigo.

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### I. INTRODUCTION

There are many types of pigmented lesions and each varies in the amount, depth, and density of melanin distribution [1]. The approach to the treatment of cutaneous pigmentation depends on the location of the pigment (epidermal, dermal, or mixed), and the way it is packaged (intracellular, extracellular) [1]. Many pigmented lesions are benign and are removed for aesthetic reasons only. However, some pigmented lesions have a high risk of malignant transformation. In general, epidermal pigment is easier to eradicate than dermal pigment because of its proximity to the skin's surface. The goal is to remove unwanted epidermal pigmentation, and as long as the injury is above the dermal-epidermal junction, it will heal without scarring [1]. Lentigines are epidermal pigmented lesions, and are extremely common hyperpigmented macules that most often result from chronic sun exposure [2]. They contain melanin within keratinocytes and melanocytes [1]. Histologically, melanocytes in the basal layer are increased in number without nesting and rete ridges are elongated [2]. Lentigines can be classified into several categories, including those due to chronic sun exposure (solar lentigines), those associated with a syndrome (e.g., Peutz-Jegher), and the labial melanotic macule. Use of a broadband sunscreen helps prevent new lentigines from occurring as well as the recurrence of treated lesions [1]. Correct diagnosis is a primary concern when treating lentigines, as lentigo maligna should not be treated with laser [1].

Ephelides (freckles) are small hyperpigmented macules located on sun-exposed skin [2]. Histologically, there is hyperpigmentation of the basal layer but no increase in the concentration of melanocytes [2]. Patients who tend to freckle are more likely to develop new freckles with any sun exposure [1]. The use of a broadband sunscreen is therefore indicated [1].

There are several treatment options available for management and removal of pigmented lesions, from topical tretinoin, cryotherapy and various laser modalities [3]. Even though the long-pulsed (millisecond domain) 532 nm (KTP) (a frequency doubled Nd:YAG) laser is more commonly used to treat vascular lesions, it has been successfully used to treat superficial pigmented lesions, such as ephelides and lentigos [3–5]. The theory of selective photothermolysis suggests that laser therapy would be the treatment of choice because of its ability to selectively destroy pigment without injuring the surrounding tissue. Melanin is the main chromophore in solar lentigines, and therefore is the target of selective destruction [4]. Equally important in achieving selective photothermolysis of melanin is the pulse duration. Ideally, the pulse duration of the laser should be shorter than the thermal relaxation time of the target to achieve selective photothermolysis [4]. Q-switched and longpulsed lasers differ in the effect on the target chromophore; the first one has a photothermomechanical effect, whereas the second one has a photothermal effect only. The photomechanical effect of Q-switched lasers is generally the accepted mode of action when treating the epidermal pigmented lesions, however it may not be desirable when treating the patients with higher Fitzpatrick (FP) skin types (especially IV and above) [4], as the incidence of pigmentary changes following the treatment, despite their transient nature, is higher when using Q-switched KTP laser in such patients [6]. Such patients may therefore benefit more from the long-pulsed laser application.

### **II. METHODS**

Three female patients, aged from 33 to 47, with FP skin type (III–IV) are included in this case series. The exclusion criteria were: a history of photosensitivity or the use of photosensitizing medication, recent history of previous laser therapy at the planned treatment site, existing or planned pregnancy, diabetes, autoimmune disease, breastfeeding, acute skin diseases requiring dermatological treatment, or a history of malignant disease in the area to be treated. All patients signed informed consent for the treatment and for the use of data and photographs. All three patients wished to have their pigmented lesions located on the face removed for aesthetic reasons.

The treatment of choice was long-pulsed KTP laser

(532 nm) (StarWalker, Fotona, Slovenia) using R58 handpiece. Post-treatment cooling with Zimmer Cryo 6 and ice packs was applied over the treated area. Patients were advised to apply creme containing dexpantenol (Bepanthen®, Bayer, Germany) couple times a day for the next two days. Patients were also advised to avoid sun exposure and to use sun protection. All patients were followed-up after 6 weeks to assess the effectiveness of the laser procedure and detect any potential side effect of laser treatment.

### III. CASES

# a) a) Case 1: VERDE for treatment of lentigines and rough skin texture

Case 1 is a 46 year old, FP skin type IV female patient with a complaint of lentigines and rough skin texture (Figure 2). The patient has previously received multiple Q-switched Nd:YAG laser treatments with unsatisfactory outcome, that has rendered the patient to stop with the treatments for few years.

Full face treatment with no overlapping was applied in a single session, using the parameters presented in Table 1. Treatment was performed without anesthesia. Immediate post-treatment cooling with Zimmer Cryo 6 and ice packs was applied over the treated area.



Fig 1: Case 1 - Patient complaining over lentigines and rough skin tone: before (left) and 6 weeks after single session (right)



Fig 2: Case 2 - Patient complaining over ephelides before (left) and 6 weeks after single session (right)

### b) Case 2: VERDE for removal of ephelides

Case 2 is a 35 year old, FP skin type III female with unwanted ephelides on her cheeks. After uneventful test spots, the ephelides were removed using the longpulsed KTP (StarWalker, Fotona, Slovenia) and the parameters used are presented in Table 1.

Single non-overlapping pulse was applied directly over each lesion while stretching the skin. Treatment was performed without anaesthesia and no cooling was used during the procedure. Immediately after the procedure, the treated areas were cooled with Zimmer Cryo 6 and ice packs.

## c) Case 3: VERDE for removal of ephelides and solar lentigo

Case 3 is a 32 year old, FP skin type IV female with ephelides and a solar lentigo on her upper cheek, that she wished to have removed. Removal was performed with long-pulsed KTP (StarWalker, Fotona, Slovenia) using the parameters reported in Table 1.

Single non-overlapping pulse was applied directly over each lesion while stretching the skin. No anesthesia was needed or used, but immediate posttreatment with Zimmer Cryo 6 and ice packs were applied.



Fig 3: Case 3 - Patient complaining of ephelides and lentigo: before (left) and after 6 weeks after single session (right)

Case	Indication	Spot	Fluence	Pulse	Frequency
		size	[J/cm <sup>2</sup> ]	duration	[Hz]
		[mm]		[ms]	
1	Lentigines,	6	5.4	15	1
	rough skin				
	texture				
2	Ephelides	3	4.4-4.8	15	1
3	Ephelides,	2–3	4.4-5.2	15	1
	lentigo				

Table 1: Summary of the parameters used for treatment of patients.

### **IV. DISCUSSION**

Long-pulsed KTP (532 nm) is commonly used for treatment of superficial vascular lesions, but owing to the broad absorption spectrum of melanin, it can be used also for removal of epidermal pigmented lesions, with excellent results when used for lentigines and ephelides [7]. Another 532 nm KTP modality using shorter pulse durations, Qswitched, can also be used for removal of pigmented lesions with equivalent results, however when compared to long pulsed KTP, Q-switched KTP is in general associated with a higher risk of PIH, especially in darker FP skin types [6] and higher pain score or discomfort during treatment [4]. Several studies in darker skinned Asian populations showed similar efficacy but improved safety profile of long-pulsed visible light lasers compared to their Q-switched counterparts [8,9]. In patients with lighter FP skin types, Q-switched KTP may be the treatment of choice. Compared to other treatment modalities that can be used for removal of pigmented lesions, long pulsed KTP proved to be at least as effective as liquid nitrogen, IPL or long pulse krypton laser, and is generally considered less painful [3]. Along with the removal of pigmented lesion, long-pulsed KTP can be used also for non-invasive skin resurfacing and tightening [10,11]. The effect of the procedure is evident in Case 1.

The treatment with long-pulsed KTP generally does not require the use of anaesthetics [5,11], which has been the case also when treating patients presented in this report. Skin cooling should not be used during the treatment, since photothermolysis of an epidermal target is needed. Laser fluence needed for such treatments depends on spot size, pulse duration as well as the presence/absence of sapphire compression window. In this case series compression window was not utilized; hence also the fluences used were lower than those reported in the literature. In general the pressure diascopy with a sapphire compression window is used for two reasons: pressure on skin layers so to evacuate the next most susceptible competing chromophore from the treatment field (haemoglobin), as well as providing better index matching for transition of laser energy to the target.

The endpoint of epidermal pigment treatment with

VERDE should be a mild darkening or greying of the pigment, with no audible snap or aggressive scabbing of the pigmentation spots. In the literature there have been some reports of mild erythema and oedema present immediately after the treatment with long-pulsed KTP, but these were resolved using cold air cooling or cooling pads [5]. Cooling pads are more recommended than the use of cool air cooling, since the latter can result in significant skin dehydration which is not ideal for post treatment recovery. Post-treatment cooling is essential for minimization of thermal injury and potential subsequent scarring and PIH.

In conclusion, we have shown that long-pulsed KTP can be safely and effectively used for removal of ephelides and solar lentigos in patients with FP skin type IV, with no long-lasting adverse effects. Full-face application of longpulsed KTP can result in improved skin texture and tone.

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