

A case of ochronosis successfully treated with the picosecond laser

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Summary

Exogenous ochronosis is a cutaneous condition characterized by blue-black pigmentation resulting as a complication of long-term application of skin-lightening creams containing hydroquinone and other substances such as quinine, phenol and mercury derivatives. We report a case of a 55-year-old woman who developed exogenous ochronosis as a result of prolonged use of topical hydroquinone for 5 years, characterized by greyish hyperpigmented patches on the nose and cheeks. The diagnosis was confirmed histologically. Treatment with picosecond laser resulted in marked clinical improvement together with improvement in overall texture and quality of the skin.

KEYWORDS

hydroquinone, melasma, ochronosis, picosecond laser

1 | INTRODUCTION

The term ochronosis is derived from the Greek word ochro (yellow) and osis (state).¹ Typically, it manifests with hyperpigmented, reticulated and asymmetric macules and patches of blackish, bluish-black or brown discoloration, located mainly in the malar region, cheeks and neck.² It is classified as exogenous as a rare hereditary endogenous variant—alkaptonuria—can present with similar looking patches.³ Its prevalence is estimated between one case per 250 000 and 1 000 000 inhabitants⁴ and is due to the inability to metabolize homogentisic acid (HGA) due to an insufficiency of homogentisic acid oxidase (HGAO) enzyme, leading to HGA being oxidized and accumulated in tissues by forming polymers and pigment deposits similar to melanin.⁵ Towards the fourth or fifth decade, musculoskeletal symptoms appear, characterized by pain of variable and progressive intensity at large joints.

On the other hand, exogenous ochronosis was initially described by Pick, in 1906⁶ as a pathology secondary to the prolonged application (6 months or more) of topical medications, mainly hydroquinone. There have been cases reported due to the use of quinine, phenol and mercury derivatives.

Hydroquinone is a dihydric phenol, which acts by inhibiting the enzymatic action of 3,4-dihydroxyphenylalanine tyrosine with an

inhibitory mechanism of HGAO in the skin, which leads to an accumulation of homogentisic acid in the dermis.⁷

Three clinical stages are described for exogenous ochronosis according to Dogliotti,^{6,8} the first is erythema and mild pigmentation, the second is hyperpigmentation, milia and mild atrophy—with the third variant presenting with papulonodular lesions. Unlike endogenous ochronosis, there is no systemic involvement. In both cases, the deposit of ochre-yellowish pigment in the collagen fibres of connective tissue with elastotic degenerative characteristics (banana-shaped fibres) is evidenced histologically (haematoxylin-eosin staining⁸).

2 | CASE REPORT

A 55-year-old female with Fitzpatrick skin type IV with hyperpigmented greyish patches in the malar region since adolescence, for which she started treatment with topical hydroquinone for 5 years with a significant improvement. Subsequently, she discontinued the topical hydroquinone when hyperpigmented areas with bluish-grey discoloration appeared (Figures 1 and 2).

As a relevant background, four of her siblings had cancer (two had breast type and the other two thyroid type). There was no history of



FIGURE 1 Blue-black areas in the malar region and back of the nose, compatible with the diagnosis of ochronosis



FIGURE 2 Blue-black areas in the malar region and back of the nose, compatible with the diagnosis of ochronosis

dark urine, joint pain or other symptoms suggestive of alkaptonuria. She reported a previous diagnosis of ochronosis confirmed histologically. It was previously treated with intense pulsed light (IPL), facial peelings, topical depigmenting treatment (4% hydroquinone, kojic, phytic, ferulic and citric acid), pimecrolimus and sunscreen without clinical improvement.

Treatment was initiated with fractional nonablative picosecond laser (Resolve handpiece) having bimonthly sessions starting with 1064 nm/532 nm, spot 6×6 mm, fluence 1.30/0.18 J/cm² and increasing by 0.20/0.02 J/cm² in each session until reaching 2.9/0.30 J/cm², respectively, with a uniform facial erythema as clinical endpoint. Following nine sessions, there is clear evidence of improvement in the colour of the lesions in addition to improvement in skin texture (Figures 3 and 4).

3 | DISCUSSION

Exogenous ochronosis is a rare pigmentary disorder that affects mostly women between the third and fourth decade of life. It usually occurs as a consequence of the topical application of hydroquinone in concentrations >3%.⁹

Treatment is challenging with no reported efficacious or consistent results, and therefore, prevention is the key with restricted use of hydroquinone to a maximum of 6 months with strict sun protection.¹⁰

The literature describes multiple treatments for ochronosis, with variable outcomes, and these have included the use of retinoic, azelaic and kojic acid, semiablative and ablative therapies such as intense pulsed light (IPL), Q-Switched laser, dermabrasion combined with carbon dioxide and 2940 erbium laser. No previous reports of the use of picosecond lasers were reported.

We consider picosecond lasers the ideal treatment for different skin conditions that goes beyond the removal of tattoos, such as Ota nevus, minocycline-induced pigmentation, acne scars, photodamage and rhytides¹¹ and this is due to the fact that it delivers high energy fluences in extremely short pulses in the picoseconds domain generating a photoacoustic effect with minimal thermal damage. A fractionated mode uses diffractive holographic technology (beam-splitter) that creates a bidimensional matrix of laser-induced optical breakdown (LIOB) that can be focused on the epidermis, using the wavelength of 532 nm, or in the upper papillary dermis, using the wavelengths 755 or 1064 nm. It fragments the pigment at different



FIGURE 3 Clinical improvement following eight laser sessions



FIGURE 4 Clinical improvement following eight laser sessions

levels of the skin to be phagocytosed by macrophages and eliminated by the lymphatic route; at the same time, it generates dermal vacuoles that induce the formation of neocollagen. These characteristics are of utmost importance, since they allow treating patients with high phototypes (as in the case of ochronosis) with minimal risk of hyperpigmentation and without the need of long recovery time. We treated our patient with the PicoWay device (Candela, Weyland, MI, USA) using the fractionated handpiece.

Our patient had a biopsy confirmed case of ochronosis (Figure 5) with no symptoms or history to suggest any possibility of alkaptonuria. The diagnosis of exogenous ochronosis was corroborated by the history of use of hydroquinone in the facial region for 5 years long, the presence in the malar region and the back of the nose with hyperpigmented patches with black-greyish colours and undefined edges plus a biopsy compatible with ochronosis.

A great amount of improvement was accomplished with respect to the quality, texture and colour of the skin following treatments with the laser in picoseconds fragmented in two sessions a month, eight sessions total with concomitant sun protection.

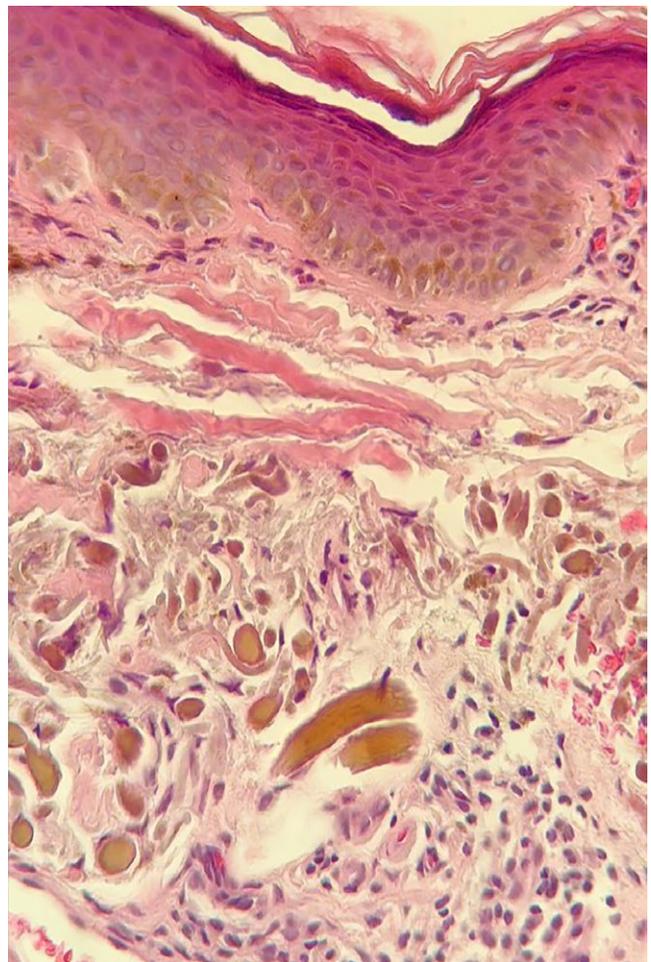


FIGURE 5 Biopsy shows beams of brown-ochro collagen and actinic degeneration of collagen "banana shape"

4 | CONCLUSION

The picosecond laser technology is an advancement in laser technology with both traditional and fractionated modes that have shown efficacy in tattoo removal, pigmented conditions and collagen remodelling. This is the first reported case in the literature to show significant improvement of ochronosis using the picoseconds technology.

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