Successful treatment of acupuncture-induced argyria using Q-switched 1064-nm Nd:YAG laser

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INTRODUCTION
Localized argyria is a benign rare condition resulting from impregnation of silver particles in the skin by various exposure sources such as silver jewelry, occupational exposures, topical medications, and medical procedures (ie, acupuncture). We report a case of acupuncture-induced argyria on the face, both dorsa of the hands, wrists, legs, and dorsa of the feet, successfully treated with 1 to 2 sessions of Q-switched 1064-nm neodymium-doped yttrium aluminum garnet (Nd:YAG) laser. Tissue section demonstrated refractile granules around the eccrine glands under dark-field microscopy.

CASE REPORT
A 42-year-old Thai woman was treated at a dermatology clinic in Siriraj Hospital and had a 3-year history of multiple asymptomatic dark spots on her face, both dorsa of the hands, wrists, legs, and dorsa of the feet. She stated that the lesions had developed approximately 2 months after frequent acupuncture (approximately 20 sessions) to relieve her bilateral tinnitus. She denied previous systemic treatment, history of tattoo dye, or any other topical formulations before the procedure. Her only underlying disease was allergic rhinitis. Physical examination revealed bilateral, symmetric, round, faint, blue-gray macules with size ranging from 1 to 3 mm in diameter on preauricular regions, nasolabial folds, both dorsa of the hands, wrists, legs, and dorsa of the feet. After 3 months, the second session of treatment was repeated on the residual lesions on the extremities. The fluence value was adjusted to 4.6 J/cm² with a 4-mm spot size. After the last session of treatment, the patient’s acupuncture-induced argyria fully resolved, without visible discoloration or...
textural change (Fig 4, C). There were no long-term adverse effects associated with the procedure. The patient was followed for 12 months and no recurrence of argyria was observed.

**DISCUSSION**

Localized argyria is a benign pigmented lesion resulting from impregnation of silver particles in the skin by various exposure sources, including acupuncture. Acupuncture-induced argyria is the fourth most common adverse event after a procedure (8.1%), particularly with silver needles. The pathogenic mechanism of this condition is oxidation of soluble compounds that are picked up by elastic fibers and the basement membrane. In contrast to generalized argyria, localized argyria usually presents with solitary or multiple blue-gray macules that may resemble blue nevi or malignant melanoma.
without nail, mucous membrane, and internal organ involvement.4,7

Histologic findings of argyria, either localized or generalized, reveal deposition of brownish-black granules observed in the basement membrane of eccrine glands, in sebaceous glands, in hair follicle sheaths, within the blood vessel walls, in perineural tissue, around arrector pili muscles, in elastic fibers, and in collagen bundles.1,4 The granules can be highlighted by Fontana-Masson silver and Gomori iron stains,1 and discolored by incubation with 1% potassium ferricyanide in 20% sodium thiosulfate.8 Under dark-field microscopy, brilliantly refractile particles are exhibited around the eccrine glands, including blood vessels, and also dispersed in the dermis.9 Other techniques available to demonstrate silver granules include scanning electron microscopy, energy-dispersive x-ray analysis, and electron probe microanalysis.3,9

Regarding difficulties in treating localized argyria, most patients are advised to avoid further silver impregnation, to apply sunscreen, and to limit sun exposure. During the past decade, Q-switched 1064-nm Nd:YAG laser has been introduced as a therapeutic option with excellent outcome.10,11 Varied power settings, spot sizes, and pulse durations have been previously mentioned in the literature. However, the laser parameters should depend on the treatment end point of immediate whitening.

The exact mechanisms of Q-switched Nd:YAG treatment for argyria are still questioned. Some experts have proposed a theory similar to that of conventional tattoo removal. The photoacoustic breakup of the particles occurs after light absorption. Subsequently, small fragments undergo phagocytosis by macrophages and are removed via the draining lymphatics.12 However, recurrence of argyria was reported after Q-switched Nd:YAG treatment by Krase et al in 2017. The laser beam converts surface plasmon resonance, resulting in emission of a distinct optical spectrum and alteration of silver sulfide to sulfate. After sun exposure, the residual particle is in reduced state and finally black silver sulfide is reformed.

In conclusion, localized argyria secondary to acupuncture needles is a benign condition that should be established in the differential diagnosis of acquired pigmented lesion. The present case report aims to verify that Q-switched 1064-nm Nd:YAG laser provides an effective and safe treatment for this condition. Moreover, our patient demonstrated dark-field microscopic findings that could be used to confirm the diagnosis of localized argyria.

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