

Argyria Syndrome: Studying the Psychological Impact and the Possible Therapeutic Alternatives

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ABSTRACT

Aim: To know the therapeutic alternatives that provide favorable results for Argyria through the use of different types of lasers.

Materials and methods: The information was collected through a bibliographic reviews, and was based on medical literature obtained from digital platforms such as Google Scholar, and journals indexed in databases.

Results: Favorable results were obtained through the use of different types of lasers such as Nd:YAG Q-switched inclusive, yttrium garnet laser and neodymium doped aluminum, in addition to oral and aesthetic therapy since there was no discoloration, change of texture in the skin or long-term adverse effects.

Conclusion: The therapeutic alternatives and the side effects of laser therapy were described, as well as pigmentary changes or abnormal scarring.

Keywords: Argyria; silver; dermis; conjunctival diseases; poisoning.

INTRODUCTION

Argyria is a disease caused by chronic silver poisoning that occurs briefly after prolonged exposure, because the absorption of this mineral exceeds the ability to be metabolized and thus precipitates as sulfide and selenide at the level of several mainly soft tissues. The blue-gray coloration occurs mainly to the stimulation of melanocytes and the decrease of sunlight. This type of exhibition will depend on factors such as: periods, sites or forms of entry of silver (Salvaneschi, Jalde, Olivares, Cendis, & Maronna, 2017).

Types of argyria:

- Localized argyria that exclusively affects the site of contact with the metal (Hernández-Collazo, Pérez-Lizárraga, & Hernández-Arana, 2015; Campos, & Gutierrez, 2015)
- The generalized form that is produced by the ingestion, inhalation or percutaneous absorption of compounds derived from silver, mainly asymptomatic (Hernández-Collazo, Pérez-Lizárraga, & Hernández-Arana, 2015; Wong, 2019)

Clinical manifestations:

The clinical manifestations are bluish-blackish coloration at the level of the dermis, conjunctiva and lunules that can trigger serious manifestations such as fatty degeneration of the liver, kidneys and heart (Aronson & Meyler, 2016; Fukayama, Asano, Omatsu, Kawashima, Shirai, & Sato, 2020; Alcántara, Boixeda, Truchuelo, Jiménez, Pérez, Pérez, & Olasolo, 2018)

Histopathological findings:

At the level of the dermis it presents a bluish-gray macula, while in the epidermis there are black globoid particles of various sizes, which appear within the walls of the superficial and deep vascular plexus. Likewise, darkfield microscopy showed numerous white refractile particles around the eccrine glands and vascular structures((Arunkajohnsak, et al., 2020; Prezzavento, n.d. ; Tapia & Guerra 2021; Bologna, Schaffer & Cerroni, 2018)

Keratin condensation and blackish-brown pigment deposition in the stratum corneum are also observed, which does not greatly affect the epidermis or dermis, there is only a discrete superficial perivascular lymphocyte inflammatory infiltrate (SALVANESCHI, 2017; Weiss, Streight, Risk, & Markus; Sánchez-Martínez , García-Briz , & Moneva, 2021; Arunkajohnsak, et al., 2020; Aronson & Meyler, 2016; Hernández-Collazo, Pérez-Lizárraga, & Hernández-Arana, 2015; Jung, et al., n.d.).

Predisposing factors:

Age is not a predisposing factor for the appearance of this disease because the individual only needs a direct contact or inhalation to trigger the disease, it is for this reason that cases of patients with symptoms from 5 to 73 years have been reported, with characteristic signs of the disease, all this was determined by using a biopsy where the infiltration of lymphocytes as well as blackish extracellular granules was shown at the level of the dermis and between the collagen bundles (Griffith, et al., 2015; ASTUTO, 2014; SALVANESCHI, 2017; Weiss, Streight, Risk, & Markus; Sánchez-Martínez , García-Briz , & Moneva, 2021; Arunkajohnsak, et al., 2020).

Therapeutic alternatives:

As for the alternatives, after laser treatments, only certain options were available to treat this change in color or discoloration of the skin, some ineffective such as: dermabrasion, hydroquinone and other depigmenting creams (Weiss, Streight, Rizk, & Markus; Sánchez-Martínez , García-Briz , & Moneva, 2021; Arunkajohnsak, et al., 2020; Aronson & Meyler, 2016; Hernández-Collazo, Pérez-Lizárraga, & Hernández-Arana, 2015, Jung, et al., n.d.)

Laser treatment:

Currently one of them is using the Nd: YAG Q-switched laser, which showed favorable results to the patient in the fourth session of the therapy (ASTUTO, 2014). Through database reviews it was obtained that in the last 6 years cases of argyria have been described that were successfully treated with this type of laser, but the results were not recorded in the dermatological literature (Griffith, et al., 2015).

As for the Nd laser: 1064 nm YAG of Q-switched (Medlite C3; HOYA ConBio, Fremont, CA) is reported a case in which it was used to treat only certain discolored spots on the skin, and was started with a creep of 4 J/cm² with a spot size of 3 mm. Ash white staining of the bluish-gray macula was obtained. After two weeks the lesions healed completely, due to this the laser was applied with the same parameters in the left preauricular region, nasolabial folds, both dorsum of the hands, wrists, legs and back of the feet. (Londoño, Pérez, Restrepo, Morales, Martínez, & Morales, 2021)

After three months the second treatment session on residual lesions in the extremities was repeated, here the fluence was adjusted to 4.6 J / cm² with a spot size of 4 mm. And finally after the last treatment session, the patient's acupuncture-induced argyria resolved completely, there was no visible discoloration or change in texture, no long-term adverse effects associated with the procedure were observed, then treatment was continued for 12 months, with no recurrence of argyria observed (Arunkajohnsak, et al., 2020).

A comparison was also made with two types of lasers used in this pathology; yttrium garnet and neodymium-doped aluminum laser therapy may be safe and effective; a previous report has suggested that picosecond alexandrite laser is at least equivalent to other laser modalities reported in the treatment of diffuse argyria. In this way the alexandrite laser of 755 nm picosecond compared to the Nd: YAG of 1064 nm of Q switching that is more used, suggests that the picosecond alexandrite shows the same efficacy for the treatment of this pathology.

Although more prospective comparing the safety and efficacy of the two modalities (Weiss, Streight, Rizak, & Markus; Lipsker & Lenormand, 2017).

He also investigated the clinical history in search of transient adverse effects, such as: edema, infection or ulceration, or in turn pigmentary changes or abnormal scarring. We studied 7 patients of which 4 of them presented mild atrophy, 2 of them marked edema and ulceration in hemangioma located in oral mucosa without subsequent residual scar and one of them hyperpigmentation, purpura and transient mild edema were not considered as adverse effects after treatment. (Velázquez-, Morales, & Torres, 2018).

Oral treatments:

Treatments with sodium thiosulfate 6% or intradermal potassium ferrocyanate, and also with selenium, vitamin E, hydroquinone and dermabrasion, have been used for aesthetic purposes without obtaining favorable results. The Q-switched Nd:YAG laser could be a therapeutic alternative (SALVANESCHI, 2017).

On the other hand, low potency corticosteroids, glycolic acid, retinoic acid or benzoyl peroxide are used, which showed considerable improvement in hyperpigmentation. Among the oral treatments that generated favorable responses are tetracyclines and retinoids, as well as complexes with vitamins E and C. (Tapia & Guerra 2021; Bologna, Schaffer & Cerroni, 2018)

Aesthetic treatments:

Finally, dermabrasion and chemical peels make up a therapy with good results according to the literature (Sánchez-Martínez, García-Briz, & Moneva, 2021).

Sunscreens and cosmetics are helpful in preventing further pigmentation and help make up obvious coloration (ASTUTO, 2014).

Therefore, based on what is stated in this bibliographic review, it is aspired to identify the treatments used by people affected by Argyria through systematic reviews, in turn describe the therapeutic alternatives and the side effects of the therapies based on clinical case studies previously described to prevent health risks and finally determine the consequences of exposure to silver through updated research on pathology to promote actions that avoid health risk. (Alcántara, Boixeda, Truchuelo, Jiménez, Pérez, Pérez, & Olasolo, 2018)

MATERIALS AND METHODS

The articles were reviewed through systematic reviews, and through the analysis and synthesis of the information, documentary research based on bibliographic sources was applied for the understanding of the treatment alternatives for the disease, in which those results could be validated with a therapeutic approach that was obtained and it was demonstrated that several people opt for laser treatment. This provides us with truthful information for the application of this therapy to other patients, considering the important results for decision making, where it was seen that the benefits are greater than the costs.

It was based on medical literature obtained from digital platforms such as Google Scholar, where important information was collected from six articles and two clinical cases, which provide us with truthful information about laser treatment to reduce the symptoms of patients and improve their quality of life.

The topic was identified by relevance, importance and risk, through systematic reviews with a therapeutic approach, in addition five investigations and a clinical case that provided us with information about Argyria were reviewed, in the same way, information available in databases and indexed journals such as Elsevier, Redalyc, Scopus and Latindex was used.

Likewise, statistical data on the pathology was collected in journals such as PubMed at the level of Latin America and the United States, providing us with low figures of confirmed cases, making it a rare disease.

RESULTS

The laser technique was applied with the same parameters in the left preauricular region, nasolabial folds, backs of the hands, wrists, legs and feet. There was no change in skin texture and no long-term adverse effects were observed, so treatment was continued for twelve months, and no recurrence of the disease was observed.

DISCUSSION

Evolution of laser therapy

- *Immediately*: Favorable results were observed.
- *First week*: The skin presented ash-white coloration instead of a bluish-gray macula.
- *Second week*: At the end of this week the bluish coloration disappeared and the color of the skin returned to its natural phototype.

By researching in different articles of indexed journals, it was possible to make a comparison between some types of lasers used to treat this pathology.

Comparison of the different types of lasers

- *Yttrium and aluminum garnet laser*: Claims to be safe and effective.
- *Picosecond alexandrite laser*: Became less equivalent to other types of lasers.
- *Q switching 1064 nm Nd YAG laser*: With respect to the yttrium and aluminum garnet laser shows the same efficiency, although more research is needed to compare the safety and efficacy of these modalities

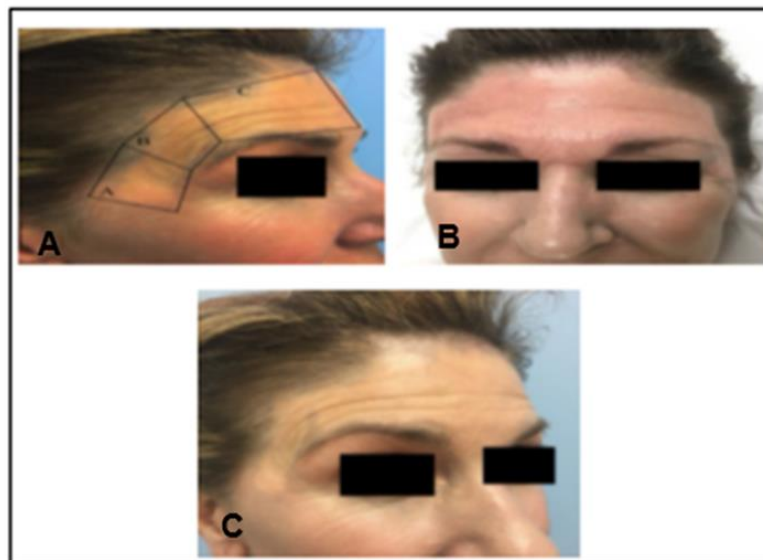


Figure .1. A. Patient presents improvement immediately after the procedure. B. Patient during the first week of treatment. C. Patient at the second week of treatment.

Source: Weiss,E; Streight, L; Rizk, C; Markus; 2019

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