Corneal Deposits in a Jeweler: A case of ocular argyrosis

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ABSTRACT

Argyrosis refers to the accumulation of silver in the body, with ocular argyrosis specifically involving silver deposits in the eyelids, conjunctiva, cornea, and lens. The incidence of ocular argyrosis has markedly decreased following the discontinuation of silver-containing topical solutions and better safey precuationsin industrial workers.

A 63 year old male, jeweler by profession, presented with gradually progressive diminution of vision of both eyes. Cornea showed diffuse confluent pigmentation at the level of Descemet's membrane. Anterior segment OCT showed distinct hyper reflective band indicative of silver deposits in Descemet's membrane.

In developing countries, limited awareness about the risks of silver toxicity and insufficient occupational safety measures may contribute to cases of visually impairing ocular argyrosis. Increased safety precautions are necessary to prevent such occurrences.

KEY WORDS

Corneal deposits, Jeweler, Ocular argyrosis

INTRODUCTION

Silver (Ag) is a metal used in various fields like metallurgy, photography, dentistry, traditional medicine, jewelry, cosmetics and silverware. Prolonged exposure to silver-containing compounds, through inhalation, ingestion or dermal abosrption, can lead to argyrosis, characteried by silver deposits found in the skin, liver and adrenal glands.[1]

Ocular argyrosis mostly manifest as slate gray discoloration in the eyelids and conjunctiva due to silver deposits in elastic fibers of connective tissue and basement membranes. In cornea, deposits may occur in Bowman's membrane, stroma, and Descemet's membrane leading to discoloration.[1] Posterior pole may show a leopard-spot pattern of the macula and a dark choroid.[2] Visual symptoms are relatively rare. Here, we present a case of a jeweler affected by corneal argyrosis.

CASE REPORT

A 63-year-old male presented with a gradual decline in both near and distant vision in both eyes (BE) over the past six years. The patient, who had been managing type II diabetes for the past four years, underwent percutaneous transluminal coronary angioplasty (PTCA) three years ago and has been consistently taking prescribed medications since. Professionally, he was a jeweler with over 40 years of experience in crafting gold and silver jewelry, typically working around 17 hours a day without using gloves, masks, or protective eyewear. However, in recent years, significantly his working hours has decreased to 4-5 hours daily due to diminishing vision. The patient noted that he had not used any silver-containing topical or oral medications.

The patient's general physical examination was normal, with no discoloration observed on his hands or nails. However, scars from a rolling machine accident during silver crafting were noticeable on his left hand. His unaided visual acuity was 6/60 in both eyes. The best corrected visual acuity (BCVA) was 6/12 (partial) in the right eye and 6/18 (partial) in the left eye. The skin of the eyelids, adnexa, and conjunctiva appeared normal. Cornea showed diffuse confluent light greenish-brown pigmentation at the level of Descemet's membrane, particularly prominent in the central and inferior regions (Fig. 1 a, b). Nuclear sclerotic cataracts of grade II were present in both eyes. The remainder of the anterior and posterior segment findings were unremarkable.

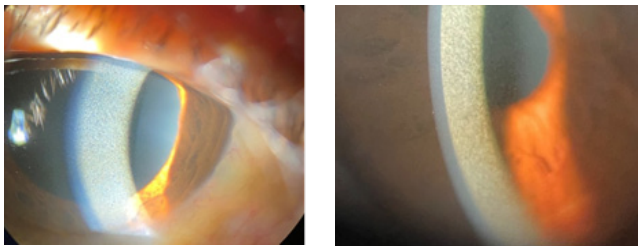

Figure 1 a, b. Clinical photographs of slit view of cornea showing greenish brown pigmentation at the level of the Descemet's membrane

Furthermore, intraocular pressure (IOP) of both eyes were normal. Specular microscopy showed normal mosaic pattern and endothelial cell count, which were 2787 for the RE, and 2561 for the LE. Pachymetry also had normal results for the RE and LE, which were 519 mm and 509 mm respectively. However, the anterior segment optical coherence tomography (AS-OCT) (Fig. 2) showed a distinctive hyper-reflective band, corresponding to deposits in the Descemet's membrane of BE.

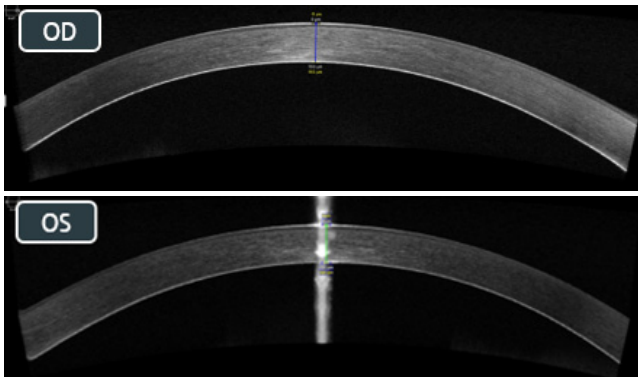

Figure 2. ASOCT showing distinctive hyper-reflective band, corresponding to deposits in the Descemet's membrane of BE

Serum ceruloplasmin and serum copper levels were found to be normal, which helped rule out the presence of Kayser-Fleischer rings that can occur due to copper deposition in Descemet's membrane. This was an important differential diagnosis to consider, as the patient showed no signs of skin pigmentation on his hands or eyelids.

Based on the history of prolonged silver exposure, along with clinical findings from the slit lamp examination and AS-OCT results, we concluded that the deposits observed in the cornea were indicative of corneal argyrosis in both eyes. The patient was advised to avoid further exposure to silver and recommended to use protective equipment, including masks, gloves, and goggles, if he chose to continue working. No specific treatment for the corneal findings was initiated, but he was advised to have regular follow-ups to monitor his cataract progression.

DISCUSSION

Ocular argyrosis, previously more common due to the prolonged use of topical solutions containing silver colloidal compounds, is now considered a rare occupational disease caused by inadequate ocular protection in the workplace. Mora et al reported a case similar to ours, in which the patient had prolonged history of making silver item.[3] Both the duration and intensity of silver exposure influence the degree of deposition, highlighting the importance of appropriate protective measures for workers. Since silver can be absorbed through inhalation, ingestion, and skin absorption, occupational safety should extend beyond goggles to include skin protection and standardized face masks. Given our patient's over 40 years of exposure with minimal protective gear, this further substantiates the diagnosis. While ocular argyrosis typically presents bilaterally, unilateral cases have also been documented.

The clinical presentation of argyrosis typically features gray-blue discoloration of the periorbital skin, bulbar and palpebral conjunctiva, lacrimal sac, as well as corneal opacities and cataracts. In our case, the patient did not exhibit any significant ocular findings aside from corneal pigmentation, aligning with the observations made by Sánchez-Huerta et al. who reported isolated cases of corneal argyrosis.[4] Silver deposits are most commonly found in Descemet's membrane, and these deposits can occur in either the central or peripheral regions of the cornea.[1,5] Central involvement, as seen in our patient, is typically associated with prolonged occupational exposure to silver, while peripheral deposits have been more frequently reported with the use of topical silver-containing solutions.[4,6]

The chief complaint in our patient was a gradually worsening decrease in vision. A study by Spencer et al concluded that silver deposits were inert and did not cause visual disturbances.[7] However, several reports have documented visual impairment in cases of argyrosis.[8,9] In our case, we determined that the patient's progressive visual impairment was attributable to both the corneal silver deposits and the presence of nuclear sclerotic cataract grade II in both eyes. While some studies done by Stafeeva et al. and Moss et al. have linked nyctalopia to ocular

argyrosis, this symptom was not observed in our patient.[5,8] while there is ongoing speculation regarding a possible link between ocular argyrosis and open-angle glaucoma, our patient exhibited normal intraocular pressure (IOP) and had an unremarkable optic disc.[10]

Silver deposits mostly occur at the level of Descemet's membrane, but in rare cases Bowman's layer can also be involved which can be evident in confocal microscopy and AS-OCT.[6,11] Confocal microscopy in corneal argyrosis will give the appearance of well-defined highly reflective dots throughout the corneal stroma.[8] In our case, however, specular microscopy did not show any significant changes. The AS-OCT findings indicated a hyperreflective band at the level of Descemet's membrane, while Bowman's layer appeared clear.

Some of the differential diagnosis of argyrosis are melanomas, keratopathies (e.g pre-Descemet dystrophy), and other depositions (iron, copper, or drugs such as ciprofloxacin). Any cases involving eye pigmentation should consider argyrosis as a potential differential diagnosis.[10] In our case, we ruled out the deposition of copper.

Ocular argyrosis does not progress once the exposure is reduced or eliminated. Various attempts at chelation therapy have been made to reverse the discoloration, these have generally proven inffective.[12] In our case, no specific treatment was initiated beyond advising the patient to minimize silver exposure and use appropriate protective gear while working.

A limitation of our case report is the absence of serum silver level measurements, as the patient declined the testing, along with the lack of histopathological examination since the conjunctiva showed no signs of discoloration associated with argyrosis.

In developing countries, awareness of the potential toxicity associated with silver (Ag) exposure is limited, and inadequate safety measures among occupational workers may contribute to the occurrence of visually impairing ocular argyrosis. To mitigate this risk, it is crucial to educate workers about the condition and emphasize the importance of using appropriate protective equipment in the workplace. Implementing educational initiatives on silver-related health risks and promoting safety practices are essential steps in preventing ocular argyrosis.

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