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Case report

Alexandrite laser induced uveitis & pigment dispersion: A case report and review of the literature

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ABSTRACT

Purpose: To describe a complication of an upper eyelid alexandrite laser procedure.

Observations: A 55-year-old woman presented with left eye blurred vision and photophobia after a left upper eyelid procedure with an alexandrite laser. She had elevated intraocular pressure (IOP), anterior chamber cell and pigment, posterior synechiae, and retroillumination defects in the left eye. She was treated with topical prednisolone and brimonidine. Six months later, although her anterior chamber had cleared and IOP had normalized, the patient reported decreased vision-related quality of life from persistent photophobia.

Conclusions and Importance: Alexandrite lasers are commonly used for hair removal and skin depigmentation. When used periocularly without proper eye protection, they have the potential to create irreversible ocular complications. This case demonstrates the importance of proper eye protection with periocular laser procedures.

1. Introduction

Alexandrite lasers are commonly used for hair removal and treatment of pigmented lesions.[1] We present a case of ocular complications from the use of the alexandrite laser. Written consent was obtained by the patient and the IRB does not require approval for case reports. We also review the literature and recommend preventive measures.

2. Case description

A 55-year-old woman with past medical history significant only for recurrent Herpes simplex virus related cold sores was referred to our clinic for evaluation of elevated intraocular pressure (IOP) and anterior uveitis of the left eye (OS). She had presented to an ophthalmologist with blurred vision, photophobia, and intermittent, 6/10 eye pain in the left eye starting 5 days after an alexandrite laser procedure to remove a pigmented lesion on her left upper eyelid. Anterior segment inflammation, iris atrophy, and an IOP in the mid 30s were found on examination. She was started on prednisolone acetate 1% four times a day, cyclopentolate 1% twice a day, and brimonidine 0.2% twice a day. After minimal improvement in her IOP, she was switched to brimonidine 0.2%-timolol 0.5% twice daily OS and referred to our clinic.

On our exam, she was found to have visual acuities of 20/20 in the right eye (OD) and 20/30 OS with an IOP of 14 OD and 23 OS with no relative afferent pupillary defect. Slit lamp exam of the right eye was normal; 2+ pigment and 1+ white cell in the anterior chamber were seen in the left eye in addition to pigment granule deposits on the iris, extensive postcrerior synechiae, and diffuse retroillumination defects (RIDs) (Fig. 1). Her posterior exam was within normal limits with a 0.4 cup-to-disc ratio in each eye and no apparent areas of focal nerve loss. Spectral domain optical coherence tomography of the retinal nerve fiber layer was normal in both eyes. She underwent anterior chamber paracentesis and was found to have no HSV, VZV, or CMV DNA present on PCR testing. Her syphilis serologies, quantiferon gold, HLA-B27 testing, and a chest x-ray were negative to exclude other known causes of anterior uveitis.

The prednisolone acetate 1% was increased to every 2 hours OS and she continued brimonidine-timolol twice daily. One week later, she had only anterior chamber pigment and was tapered off the prednisolone acetate by one drop per week. Two months later, the pigment had cleared from the anterior chamber and her IOP was 18 OS. The IOP-lowering medications were stopped. Her vision had improved to 20/25 OS, but she continued to have diffuse transillumination defects with accompanying photophobia despite use of a tinted contact lens.

3. Discussion

The alexandrite laser is a 755 nm wavelength, class 1 laser approved for hair, tattoo, and pigmented lesion removal.[1,2] Depigmentation of lesions is thought to occur by melanin-containing structures absorbing

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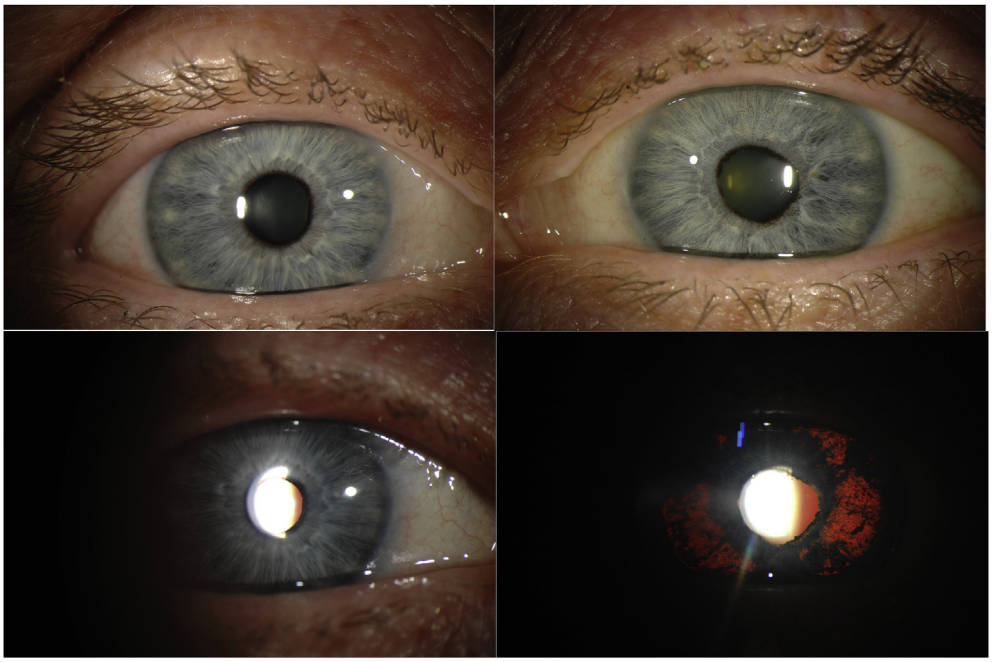

Fig. 1. Iris imaging of the right eye (left images) & left eye (right images) showing difference in color with pigment granules (top) and diffuse transillumination defects of the left eye on retroillumination (bottom).

energy which induces a depigmentation reaction. The optimal depth of penetration for these lasers is 3–4mm.[1,2]

Previously published reports (Table 1) illustrate the myriad of complications that can occur from alexandrite lasers used in the periocular region.[3–9] These adverse effects include anterior uveitis, posterior synechiae, iris atrophy, and RIDs. The RIDs persist and of cases for which visual acuity was reported, none achieved 20/20 vision during follow-up. All cases with IOP rise had resolution without long-term visual field defects. Of those with reported resolution of anterior chamber reaction, the time to resolution varied from 1 week up to 6 months. In many of the reported cases, eye protection of some sort was initially used and subsequently removed to access certain regions, or no protection was used. Many cases were reported after protection with use of fingers to cover the eyes. Also of note, many of the cases involve eyebrow removal. It has been postulated that the area covered by the laser in those cases also included some area of the upper eyelid and penetrated the eye due to a Bell's response. No cases were found in which damage occurred with concurrent use of a corneal shield.

In our patient, protective eye wear was not provided and the laser itself was applied near the margin overlying the tarsus of the upper eyelid. Given that the optimal depth of penetration for the alexandrite laser is 3–4mm, the upper eyelids are not thick enough to provide adequate protection to the underlying ocular structures. The iris pigmented epithelial layer is one of the most highly pigmented areas in the body and readily absorbs the laser energy that is transmitted through the eyelid and into the eye. This patient's blue irides, with less pigment within the stroma than brown irides, likely led to better penetration of the laser energy to the pigmented epithelium. This probably explains the loss of the pigment epithelium leading to RIDs. The elevated IOP is likely secondary to pigment deposition within the trabecular meshwork similar to that occurring in pigment dispersion glaucoma. It also may be secondary to use of topical steroids, though in most reported cases, the IOP was elevated before or very shortly after use of topical steroids making this less likely. The long-standing ocular complications of photophobia our patient continues to experience is likely a result of her RIDs allowing more light access to the retina. Her symptoms are somewhat improved with a cosmetically tinted contact lens, but the patient remains highly photophobic which has limited her ability to do computer-work.

4. Conclusion

We present only the third case of iris retroillumination defects resulting from use of the alexandrite laser around the eye. This adverse effect of the laser continues to chronically affect the patient's quality of life. We emphasize the importance of proper protective eyewear when using any laser near the eyes, since all have been reported to cause ocular damage. We recommend corneal shields be used at all times when an alexandrite laser is to be used for periocular procedures.

Patient consent

Consent to publication of the case report has been obtained from the patient in writing.

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Authorship

All authors attest that they meet the current ICMJE criteria for authorship.

Declaration of competing interest

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ajoc.2020.100632.

Table 1
Alexandrite laser induced ocular inflammation case reports summary.

Authors	Patient Age	Gender	Type of Procedure	Eye Protection	Eye Involved	Presenting VA	AU	RIDs	PS	IOP rise	Tx Given	Time to Resolution	Final VA	Time to Final VA
Gunes A, Yasar C, Tok L, Tok O[3]	33	F	Bilateral eyebrow epilation	No	OD	20/20	Yes	No	No	No	cyclopentolate, topical steroids	1 week	20/20	3 months
	28	F	Eyebrow Epilation	No	OD	20/20	Yes	No	No	No	cyclopentolate, topical steroids	3 months	20/20	3 months
Lin CC, Tseng PC, Chen CC, Woung LC, Liou SW[4]	29	F	LUL	No	OS	20/25	Yes	No	No	Yes	PF, cycloplegic, Trusopt, PSTK	6 months		
Yalcindag FN, Uzun A[5]	36	F	Bilateral Eyebrow epilation	Fingers	OS	20/20	Yes	No	No	No	dexamethasone, cyclopentolate	1 week	20/20	2 months
Karabela Y, Eliacik M[6]	38	F	Bilateral eyebrow epilation	Fingers	OS	20/20	Yes	No	No	No	PF, cyclopentolate	2 weeks	20/20	3 weeks
Herbold TM, Busse H, Uhlig CE[7]	27	F	Bilateral eyebrow epilation	Fingers	OU	20/25; 20/40	No (pigment only)	Yes	No	OS only	PF, oral steroid, pilocarpine	Not resolved	20/20 OD; 20/32 OS	9 months
Elkin Z, Ranka MP, Kim ET, Kahanowicz R, Whitmore WG[8]	41	M	Bilateral eyebrow epilation	Fingers	OU	20/20	Yes	Yes	No	No	topical steroids and cycloplegia	2 weeks OD; 1 week OS	20/20	1 month

VA = visual acuity; AU = anterior uveitis; RIDs = retroillumination defects; PS = posterior synechiae; LUL = left upper eyelid; OD = right eye; OS = left eye; OU = both eyes.

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