



Case report

Acute cataract development in a 43-year-old woman after an ultrasound eyelid-tightening procedure

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ABSTRACT

Purpose: The purpose of this article is to describe a severe side effect presentation of a bilateral cataract after treatment with intense focused ultrasound (IFUS) and subsequent uneventful cataract surgery.**Observations:** A 43-year-old woman presented to the emergency room with decreased visual acuity several hours after undergoing an eyelid-tightening procedure using IFUS. The patient's vision was decreased (R>L), a result of an acute cataract, which had an unusual appearance and consistency. Several weeks later, visual acuity had decreased further in the right eye to 20/400 and the patient underwent uneventful laser-assisted cataract surgery with intraocular lens implantation, which resulted in full visual recovery.**Conclusions and importance:** This case emphasizes the need for particular attention to possible side effects resulting from periocular IFUS, including severe ocular impact requiring surgical intervention.

1. Introduction

Cosmetic treatments are becoming increasingly popular. One such treatment applies intense focused ultrasound (IFUS) to the surface of the skin, delivering heat to the dermis and subdermis, which in turn induces an increase in collagen production.¹ During the healing process, the skin tightens. IFUS has been approved for eyebrow, neck and submentum skin lifting.²

Side-effects of IFUS are generally minimal and may include erythema, mild pain and mild tenderness, without any long-term adverse effects or ocular involvement.² Presented here is a case of severe ocular involvement, acute cataract formation following IFUS.

2. Case report

A 43-year-old female patient presented to the emergency room with red, painful right eyelids several hours after undergoing IFUS periocular skin treatment for eyelid laxity. The patients' medical and ocular history were unremarkable. Seven years prior she had undergone an uneventful photorefractive keratectomy, including documented emmetropia and

20/20 vision in both eyes six months postoperatively.

Examination of the right eye revealed visual acuity (VA) of 20/66, a red and painful eyelid, clear cornea, deep and quiet anterior chamber, the pupil round and reactive to light. Four opacifications with a raindrop-like configuration as well as a posterior subcapsular cataract with a flower shape were noted in the intraocular lens. The vision in the left eye was unaffected (20/20). The intraocular lens in the left eye had one area of opacification. The retina, optic nerve and vitreous were unremarkable in both eyes.

The patient was given dexamethasone eye drops and asked to return for a follow-up two days later. At that visit, VA had decreased to 20/133 in the right eye but had remained 20/20 in the left. The lens opacifications had progressed in the right eye and cells were observed in the anterior chamber. Ultrasound, performed because the view of the fundus was poor, was found to be within normal limits.

One month after the first presentation, the patient presented to Enaim Refractive Surgery Center for a second opinion. The refraction in the right eye was $-4.00-1.50 \times 140$, providing a best corrected VA of 20/400. The refraction in the left eye was plano-0.50 $\times 180$ which provided a VA of 20/20. A severe and visually significant cataract was

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noted in the right eye and the fundus was visually obscured (Fig. 1); the left eye had one area of opacification (Fig. 2). Ultrasound imaging from the emergency room visit was within normal limits. Corneal tomography was similar to that of the last post-op examination after her photorefractive keratectomy (Fig. 3).

Femtosecond laser-assisted cataract surgery with implantation of a monofocal intraocular lens (IOL) was performed in the right eye (Video1, Fig. 4). The cataract surgery was uneventful; however, the surgeon (SL) noted that the cataract was stickier in consistency than usual. Despite the 1.5 D of astigmatism measured in the examination prior to surgery, it was decided not to implant a toric IOL due to concerns that the lens zonules may also have been damaged by the IFUS, which would potentially compromise the stability of the IOL. Ten days postoperatively the uncorrected visual acuity in the right eye improved to 20/25. At the one month follow-up, VA was stable at 20/25 in the right eye and 20/20 in the left eye. At the final exam, nine months postoperatively, VA was 20/20 in both eyes. Postoperative macular optical coherence tomography was within normal limits in both eyes (Fig. 3).

Supplementary video related to this article can be found at <https://doi.org/10.1016/j.ajoc.2021.101226>.

3. Discussion

Presented here is a case of a 43-year-old woman who developed acute cataract several hours after treatment with IFUS. Intraocular lens

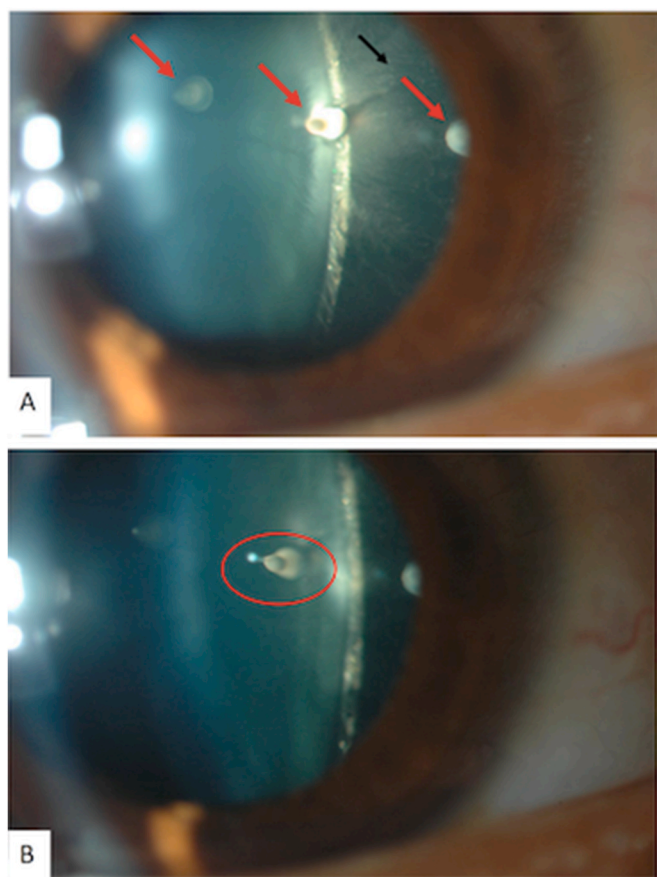


Fig. 1. Right eye, one month after the initial emergency room presentation. Several opacifications can be observed, which were documented as acute cataract. A) Three of the four areas of cataract (red arrows). Note the small areas of opacification between the large ones (black arrow). B) Larger magnification of the right eye. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

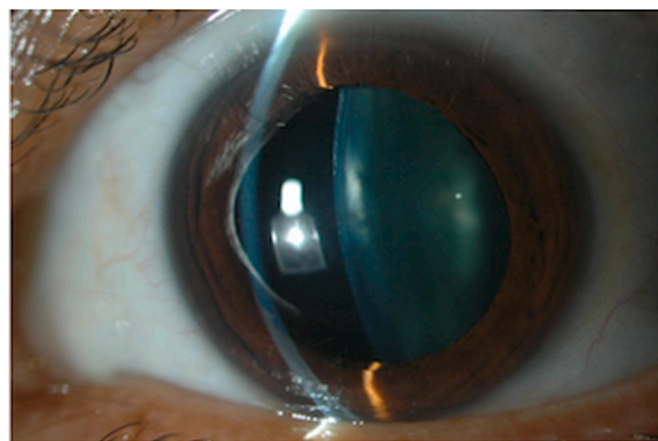


Fig. 2. Left eye, showing mild lens opacification.

opacities were noted in both eyes, but were far more significant in the right eye. These opacities progressed to the point cataract surgery was required to restore vision.

Although IFUS is largely considered a safe procedure, there have been several reports of ocular damage associated with it, sometimes requiring cataract surgery for visual rehabilitation, as in the case presented here. Jung et al.³ were the first to publish such an association. In their report, the patient suffered from an acute corneal trauma and developed astigmatism shortly after treatment with IFUS. With topical steroid treatment, the patient improved and the astigmatism decreased. Chen and colleagues⁴ reported a case with a more severe ocular impact. The patient presented with increased intraocular pressure, iris damage and an acute myopic shift accompanied by a spasm of accommodation. A relative afferent pupillary defect was also noted. Partial vision was restored after treatment with a cycloplegic agent. Recently, Kashfi et al.⁵ described a unilateral case of cataract formation after IFUS. The contour of the cataract was similar to that presented here, but did not significantly impede vision and was not treated.

Both of our patient's eyes, but primarily the right, were affected by unusual cataracts. The cataract here was dissimilar to that commonly seen post-blunt trauma both in its' unique shape and the distinct drop-like areas of opacity, as well as it affecting all parts of the lens (Fig. 1).

The nature and speed of this cataract formation is not an expected development. The combination of the patient's young age, the shape and consistency of the cataract, and the acute decrease in VA several hours after painful IFUS treatment all seem to indicate the cataract developed as a result of the treatment. The similarity to the contour of the cataract in a previous case also suggests that the cataract in our patient is the direct result of the IFUS treatment.⁵

IFUS uses ultrasound energy to cause zones of thermal coagulation.⁶ Eyelid skin is of the thinnest in the human body⁷ and therefore especially sensitive to thermal energy. The injuries to the ocular structures were compatible with those caused by heat, which can induce an inflammatory reaction, as was indicated here by the cells seen in the anterior chamber at the one-day post procedure emergency room visit.

Although IFUS is not commonly used in the periorbital area, Suh and colleagues reported use in 15 patients.⁸ They reported no serious, delayed or permanent side effects at the six month follow-up.

It is interesting to note that the diameter of the injury in the previous case reports and in this case are similar, but different structures of the eye were affected: the cornea,³ iris,⁴ and lens (this case). This difference may be a result either of the duration of the treatment or the probe used.

Animal experiments during the 1980s tested the capability of IFUS to create a small localized cataract, thus preventing the development of generalized cataract, after the traumatic rupture of the lens capsule.⁹ The article included an image of a lens treated with discrete mode that is very similar to the size of lens opacities shown in our patient.

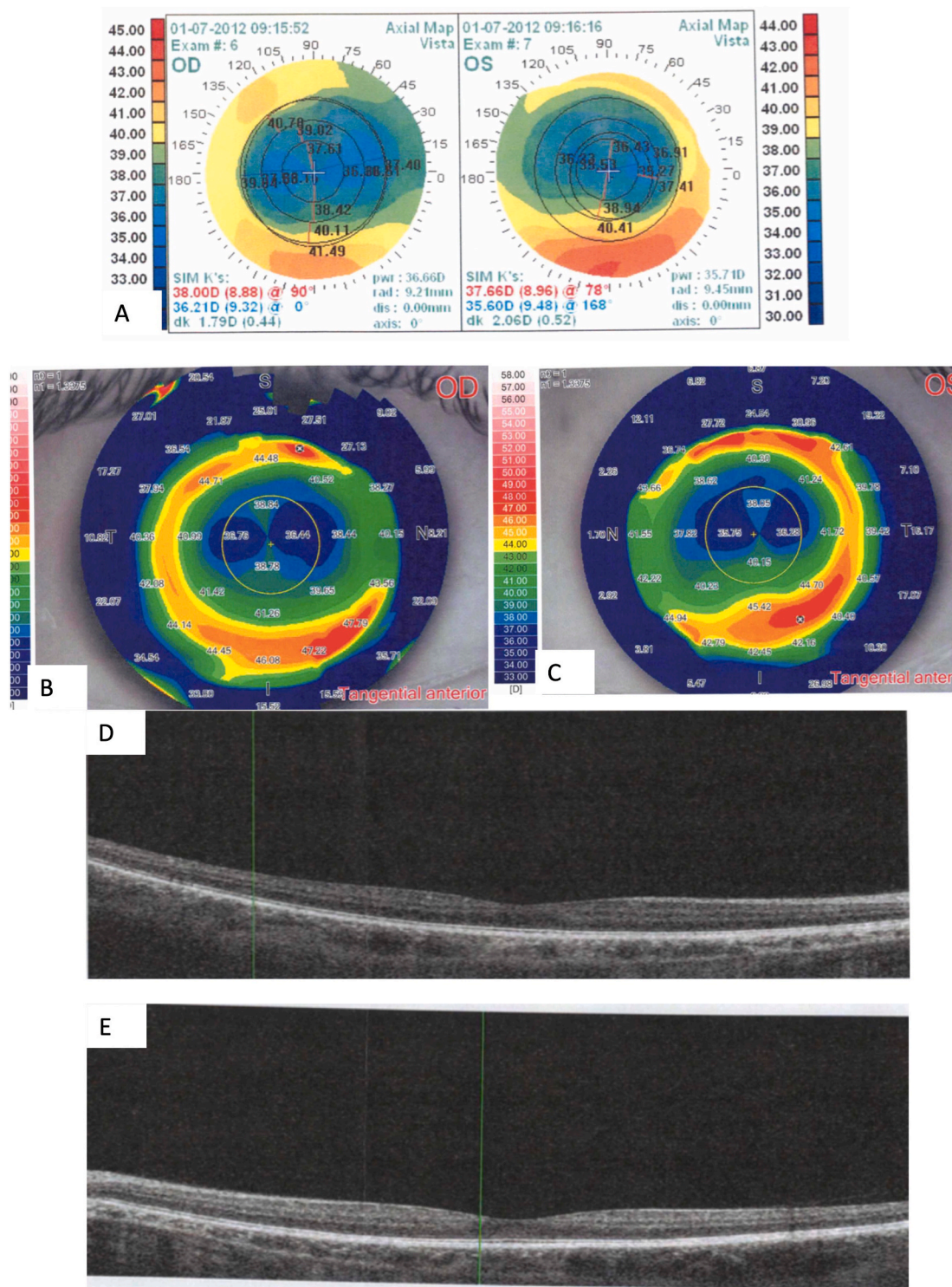


Fig. 3. Corneal topography and optical coherence tomography. A) Both eyes, normal corneal topography before the refractive surgery in 2012. B+C) Both eyes, showing normal post-myopic treatment corneal tomography, after the cataract had developed. The tomography does not demonstrate damage to the cornea secondary to IFUS. D+E) Optical coherence tomography of the retina of both eyes. This image was taken after the surgery in the right eye, as the fundus was obscured before the surgery. Optical coherence tomography of the left eye at the time of diagnosis of the cataract was normal (not shown).

Our patient had received IFUS from an unlicensed beautician rather than a certified physician. Although this currently complies with local Israel regulations, the unconventional use of the IFUS on the eyelid raises considerable ethical concerns and regulatory questions. This and the similar case reports emphasize the need for particular attention when IFUS is applied in the periocular area and suggests the procedure

be monitored by a certified physician when performed in close proximity to the eyes.

Patient consent

The Helsinki committee has allowed for approval without consent as

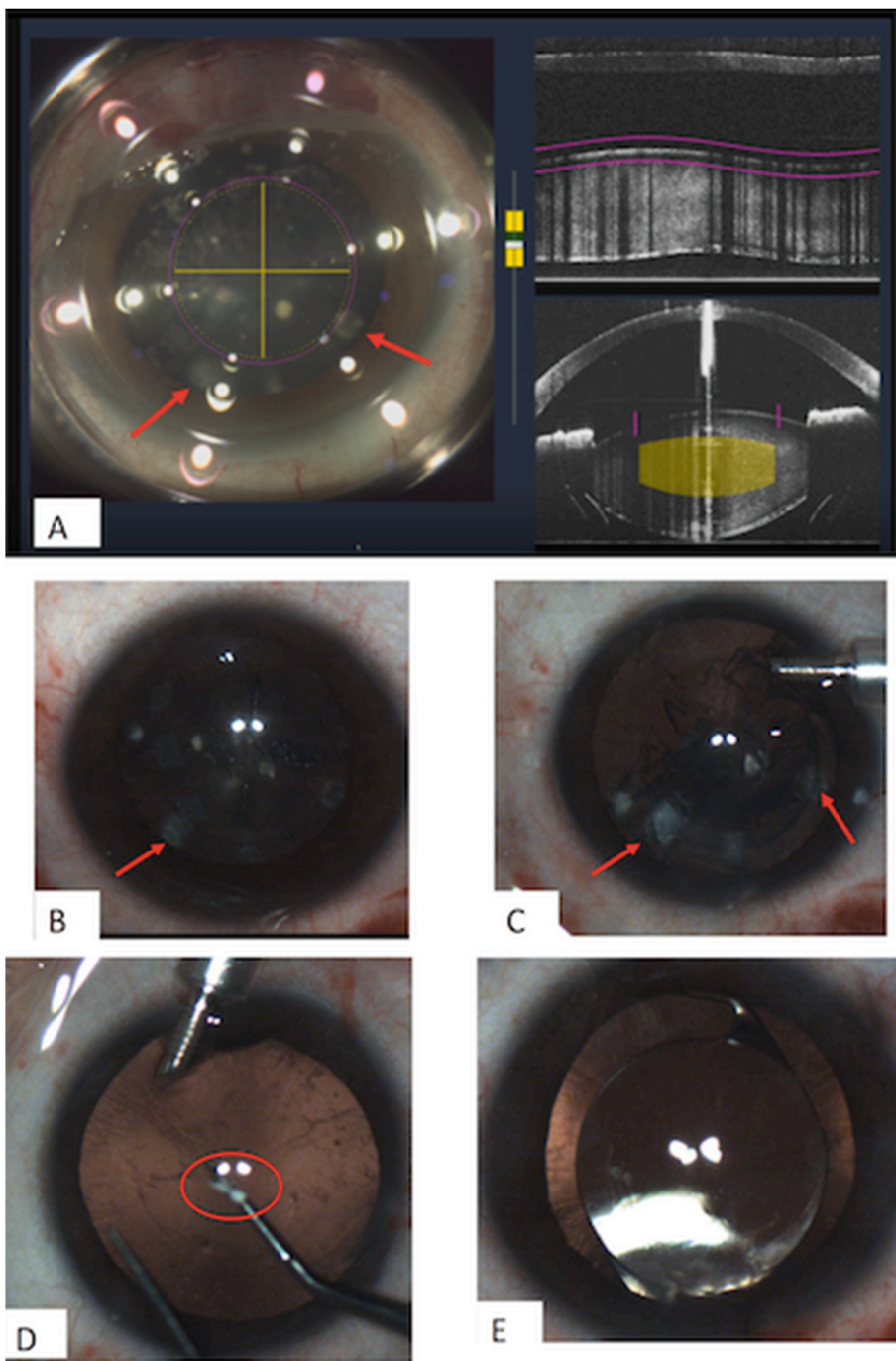


Fig. 4. Intra-operative images of the uneventful femtosecond laser-assisted cataract surgery. A) Femtosecond laser image demonstrating the cataract area (red arrow). B) After capsulorhexis and breaking of the lens with the femtosecond laser. The white areas are the cataract: one is indicated with the red arrow. C) After nucleus removal. The cortex contains some of the cataract material. D) The cataract material outside of the eye. It was composed of distinct parts that were able to be grabbed by forceps. E) End of the surgery, intraocular lens in the bag. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

no patient details were breached and standard of treatment was given.

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Authorship

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