Case Report

Negative Dysphotopsia after Uncomplicated Phacoemulsification

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Purpose: To describe the complaint of images of darkness or crescent like shadow in the temporal field of patients after undergoing cataract surgery, termed as negative dysphotopsia (ND).

Material and Methods: Three patients of either gender are described, who underwent uncomplicated phacoemulsification with in-the-bag implantation of Acrysof acrylic intraocular lens (IOL), model SA60AT (Alcon – USA), under topical anesthesia at surgical day care of Aga Khan University Hospital, Karachi. All procedures were performed from March 2008 to October 2012. First two patients were 65 and 67 years old ladies, while the third patient was a gentleman, age 56 years.

Results: All three patients complained of ND symptoms. The first patient's symptoms lasted for one year at her last visit. The second patient's symptoms disappeared within three months without any specific treatment. The third patient still had the complaint, one month post-operatively.

Conclusion: ND is a relatively common post-operative complication after uncomplicated in-the-bag IOL implantation. In majority of the patients, symptoms are transient but some patients can complaint about seeing these temporal shadows for long time.

Negative dysphotopsia (ND) is described as a crescent of shadow on the temporal side of vision after uncomplicated phacoemulsification with posterior chamber intraocular lens (IOL) implantation. It is characterized by patient reporting a dark line in the temporal field of vision after going under cataract surgery. The prevalence is described, ranging between 0.16 to 15%.[1] ND was first described by Davison[2], who associated it with the use of square-edge acrylic lenses. However it has also been reported with the use of round-edge silicon lenses[3]. There are two types of ND described: incisional[1] and IOL related[3]. The incisional type occurs in the immediate post-operative period after a clear cornea temporal approach, during cataract surgery. It is believed that incisional corneal edema can initiate these symptoms and once edema subsides, patient's complaint also disappears. The IOL related phenomenon last longer for several months. The exact mechanism of these symptoms is not known. It is hypothesized that square-edge lenses reflect incoming temporal light rays, thus casting a shadow on the nasal retina. Some analysts believe that, this is probably due to combination of multiple factors, such as, incisional site, IOL design and ocular anatomy[4]. Various workers have described certain preventing measures to avoid this annoying symptom by placing the IOL with its haptic at 3 and 9 O' clock position[4]. It is presumed that placing the haptic in such a manner reduce the effect of the square – edge.

We describe 3 patients with ND symptoms who were operated upon by the author.

MATERIAL AND METHODS

Patient 1: A 65 year old woman had uncomplicated phacoemulsification under topical anesthesia in her right eye in March 2008, through clear corneal approach temporally. She had implantation of 21 diopter, 1 piece injectable IOL, model SA60AT Acrysof

(Alcon – USA), implanted in – the – bag. One week post-operatively she can see 6/7.5 unaided, but complained of seeing a dark shadow in the temporal visual field. Two weeks later, she went under same procedure on her left eye with the implantation of same model of IOL in power of 20.5 diopters. This time, incision was made in clear cornea at 9 O'clock position. Although, she read 6/7.5 unaided in this eye, but complained again of seeing a dark crescent in her left temporal field. One year after her surgery, she still has these temporal shadows but has learned to live with them.

Patient 2: A 67 years old woman had uneventful cataract surgery on her right eye in May 2009, through clear cornea temporally with in-the-bag implantation of one piece Acrysof SA60AT (Alcon – USA) IOL of 19 diopter power. Postoperatively she improved to 6/7.5 with -0.5 DS / -0.5 DC x 70°. She complained of seeing temporal shadow in the immediate postoperative period. But her symptoms disappeared within 3 months without any specific treatment.

Patient 3: This 56 years old gentleman had cataract surgery on his left eye in October 2012, through clear corneal incision at 135°. He had a single piece Acrysof SA60AT (Alcon – USA) of 23 diopters implanted in-the-bag, with IOL haptic positioned at 3 and 9 O' clock. Postoperatively, though he improved with – 0.5 DC x 170° to 6/9, he bitterly complaint of dark shadow in his temporal field. One month post-surgery, his symptoms are still persisting.

DISCUSSION

Dysphotopsia involves seeing images or dark spots in front of the eye after cataract surgery. There are two types of dysphotopsia described. A positive dysphotopsia refers to images of light and negative dysphotopsia referring to images of darkness and crescent like shadow in the temporal field of patient after undergoing uncomplicated in-the-bag IOL implantation.

Osher[1] has categorized ND symptoms as short term or long term. He believed that short term symptoms were incision related, mostly on the temporal side in clear cornea not covered by the eyelid while long term symptoms were more prominent in patients with shallow orbit and brown eyes.

Holladay and coworkers[5] using Zemax optical design program simulator, hypothesized that primary optical factors required for ND symptoms are small pupil, a distance behind the pupil of 0.06mm or more and 1.23mm or less for acrylic IOL, a sharp-edge design of IOL and a functional retina that extends anterior to the shadow. He cited high index of refraction optic material, angle alpha and the nasal location of the pupil as secondary factors.

Using non-sequential component Zemax ray-tracing technology, Hong and co-researchers[6] hypothesized that; anterior capsulorhexis interacting with IOL could induce ND symptoms.

Masket and co-workers[3] believe that, anterior circular round capsulorhexis edge overlapping the IOL creates the negative shadow confirmed by ray tracing analysis. These authors suggested that, ND does not develop when IOL is on the top of the capsule. In their study of 12 eyes of 11 patients with ND symptoms, piggy back IOL implantation was performed in 7 cases, reverse optic capture (ROC) in 3 cases, in-the-bag IOL exchange in 3 cases and iris fixation of the capsular bag – IOL complex in 1 case. The primary outcome measure was resolution of ND symptoms and secondary outcome measure was evaluation of posterior chamber anatomy with ultrasonic biomicroscopy (UBM). In their cohort of patients, symptoms of ND were partially or completely resolved in 10 patients having ROC or piggy back IOL implantation. According to these authors ROC may be employed as a secondary surgery for symptomatic patient or as a primary prophylactic procedure. The procedure involves, freeing the anterior capsule from the underline optic by visco-dissection and retraction of nasal and temporal anterior capsule edge to slip it under the optic. Secondary piggy – back IOL is another surgical method described by Ernest[7] that has proven successful for patients with symptomatic ND. In this method, a second IOL is implanted in the ciliary sulcus above the primary IOL-capsular-bag complex.

Trattler[8] in his study of 142 eyes reported 11 patients complaining about ND. He performed Piggy back implantation, ROC, in-the-bag IOL exchange and iris suture fixation of capsular bag-IOL complex. The symptoms of ND were partially or completely restored in 10 of his patients who underwent Piggy back IOL implantation or ROC. No improvement was observed in patients who had in – the – bag IOL exchange or iris suture fixation of the capsular bag – IOL complex.

Cooke[9] has described a patient with ND, having uncomplicated in – the – bag IOL implantation with

scleral tunnel incision at 10.30 O′ clock position, entirely covered by upper lid. Patient's complaint lasted for 6 months, eventually having IOL exchange with clear cornea, temporal incision resulting in disappearance of symptoms. The case reported here shows that, not all cases of ND are due to temporal corneal incision because patient's symptoms occurred with scleral tunnel incision and resolved after IOL exchange with temporal incision.

Narvaez and coworkers[10] described symptoms of ND in 2 patients, age 70 and 62 respectively, which had uneventful small incision cataract surgery with Technis Z9000 IOL (Pharmacia – USA). These symptoms persisted in both patients for more than 1 year.

Osher[1] studied the incidence, course and common factors of patients with ND with possible role of corneal incision in cohort of 250 patients going under uncomplicated phacoemulsification with single-piece acrylic IOL. His study revealed incidence of ND at 15.2% in the first post-operative day, decreasing to 3.2% after one year and 2.4% after 2 years. He related shallow orbit, prominent globe and space greater than 0.45 mm between the iris and IOL by ultrasonic biomicroscopy in patients with ND symptoms. He also hypothesized that corneal edema associated with beveled temporal incision was related to the patient's transient symptoms.

Varmosi et al[4] reported six eyes out of 3,806 cataract procedures performed, reporting severe ND symptoms. An IOL exchange was performed in three cases. In one case, the secondary IOL was implanted in the reopened capsular bag. In two cases, secondary IOL was placed in the cilliary sulcus. The ND symptoms disappeared in all cases except one having secondary IOL placed in the capsular bag. In his patients, the distance between the iris and IOL optic was not statistically different between the eyes with or without symptoms. However, the symptoms of severe ND improved when IOL exchange reduced the iris – IOL distance.

Masket[11] believes that, in patients whose temporal shadows disappear in the first eight weeks after cataract surgery, corneal edema may be the cause at the site of incision. In patients with prolonged symptoms, shadows may result from interaction between IOL optics and unique anatomical features. In his study of 250 eyes who had implantation of single piece acrylic IOL (SN60WF or SN60AT), three-plane 2.75 mm corneal incision was given superio-temporally in the right eye and temporally in the left eye. On 1st post-operative day, ND was reported in 38 eyes (15.2%), decreasing to only in 7 eyes (3.2%) at 1 year. The common anatomic features among this group with persistent ND symptoms were shallow orbit, prominent glow, a space greater than 0.45mm between iris and anterior surface of IOL and transparent peripheral capsule.

Trattler and coworkers[12] have described three patients, who had different types of IOLs in both eyes, but developed ND symptoms. Their first patient had SA60AT Acrysof (Alcon – USA) in one eye and a Tecnis Z9001 silicon aspheric IOL (Pfizer – USA) in another eye. The second patient received Acrysof MA60AC IOL (Alcon – USA) and a Phaco-flex S140NB silicon IOL (AMO – USA) in two eyes. The third patient had SA60AT IOL (Alcon – USA) in right eye and a Sensor hydrophobic acrylic IOL AR40e (AMO – USA) put in the left eye.

Bournas et al[13] assessed the risk of ND after phacoemulsification with the use of four different IOL models. In their series of 600 patients, they used 3 piece hydrogel Meridian HP60M IOL (Bausch and Lomb – Germany), Acrysof MA60BM IOL (Alcon – USA), Acrysof MA30BA IOL (Alcon – USA) and silicon Clariflex (AMO – USA) lenses. At the first follow up visit, 117 (19.5%) of their patients reported ND symptoms. They concluded that AMO Clariflex with round anterior and square posterior edge was associated with least symptoms.

All three patients described by the author had uncomplicated surgery with anterior capsule overlapping the IOL optic. Unfortunately we could not measure the distance between iris and IOL optic in our patients. However the common finding among all three patients was clear peripheral anterior capsule which we think may be reflecting the light. All these patients had clear corneal incision at different angles and even IOL haptic were left in 3 & 9O′ clock position but still these patients complained of seeing temporal dark lines.

CONCLUSION

Negative dysphotopsia is a relatively common post-operative complication after uncomplicated in-the-bag IOL implantation. The condition occurs with almost all IOLs and with clear corneal incision located in any quadrant. The patients having these symptoms should be reassured as the symptoms will disappear in majority of them over short period of time.

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REFERENCES

1. **Osher RH.** Negative dysphotopsia: long term study, possible explanation for transient symptoms. J Cataract Refract Surg. 2008; 34: 1699-1707.
2. **Davison JA.** Positive and negatve dysphotopsia in patients with acrylic intraocular lenses. J Cataract Refract Surg. 2000; 26 : 1346-55.
3. **Masket S, Fram NR**. Pseudophakic negative dysphotopsia: Surgical management and new theory of etiology. J Cataract Refract Surg. 2011; 37: 1199-1207.
4. **Vámosi P, Csákány B, Németh J.** Intraocular lens exchange in patients with negative dysphotopsia symptoms. J Cataract Refract Surg. 2010; 36: 418-24.
5. **Holladay JT, Zhao H, Reisin CR.** Negative dysphotopsia: the enigmatic penumbra. J Cataract Refract Surg. 2012; 38: 1251-65.
6. **Hong X, Liu Y, Karakelle M, Masket S, Fram NR.** Ray-tracing optical modeling of negative dysphotopsia. J Biomed Opt. 2011; 16: 125001.
7. **Ernest PH.** Severe photic phenomenon. J Cataract Refract Surg. 2006; 32: 685-6.
8. **Trattler WB**. IOL exchange, iris suture fixation failed to restore post-op negative dysphotopsia. J Cataract Refract Surg. 2011; 37: 1199-1207.
9. **Cooke DL.** Negative dysphotopsia after temporal corneal incision. J Cataract Refract Surg. 2010; 36: 671-2.
10. **Narvaez J, Banning CS, Stulting D.** Negative dysphotopsia associated with implantation of the Z9000 intraocular lens. J Cataract Refract Surg. 2005; 31: 846-7.
11. **Masket S.** Negative dysphotopsia may result from several factors. J Cataract Refract Surg. 2008; 34: 1699-1707.
12. **Trattler WB, Whitsett JC, Simone PA.** Negative dyspohotpsia after intraocular lens implantation irrespective of design and material. J Cataract Refract Surg. 2005; 31: 841-5.
13. **Bournas P, Drazinos S, Kanellas D, Arvanitis M, Vaikoussis E.** Dysphotopsia after cataract surgery: comparison of four different intraocular lenses. Ophthalmologica. 2007; 221: 378-83.