

The evaluation of ocular refractive error and axial length changes after scleral buckle removal

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ABSTRACT

Purpose: The present study aimed to evaluate refractive error and axial length changes after buckle removal due to buckle complications. **Methods:** A total of 15 patients involved in this study. The enrolled patients who had history of scleral buckling (SB) for rhegmatogenous retinal detachment referred to clinic for buckle removal due to buckle-related complications. Complete ophthalmic examinations and IOLMaster (Carl Zeiss) device performed prior and 3 months after buckle removal. Also best corrected visual acuity (BCVA), refractive error and axial length changes evaluated after buckle removal. **Results:** BCVA, refractive error, and axial length changes were not statistically significant (P value: 0.24, 0.23, 0.33, respectively). No redetachment or any other complication was observed after buckle removal. **Conclusion:** The study displayed induced globe shape changes due to SB are irreversible after buckle removal. In addition, it is a safe procedure and does not raise any risk of retinal redetachment.

Keywords: Buckle removal, rhegmatogenous retinal detachment, scleral buckling

Introduction

Scleral buckling (SB) is considered a significant surgical procedure for patients with rhegmatogenous retinal detachment (RRD) specifically for young phakic patients with anterior retinal breaks.^[1-4] Few uncommon complications were reported after SB surgery, such as buckle expose, infection, diplopia, buckle migration, and severe pain leaving buckle removal the sole choice for the surgeon.^[2,5-8] It should be noted that the main common concern for both the patients and surgeons is the risk of redetachment after buckle removal. Previously performed studies reported the risk of redetachment in a range between 0% and 50% which mostly occurred during first 3 months after buckle removal.^[9-12]

Induced refractive errors due to globe shape changes is one of the prevalent results after SB. Moreover, myopia, hyperopia, and special forms of astigmatism were reported.^[13-17] Reviewing all conducted studies, there is perceptibly scant studies devoted to refraction and globe shape changes after buckle removal. The current study aims to evaluate refraction and axial length changes after buckle removal in patients with buckle complications.

Methods

This cross-sectional study performed based on declaration of Helsinki. The samples were selected from the patients with history of SB surgery for RRD, who referred to Nikookari eye hospital; Tabriz; Iran for postoperative complications needed to buckle removal since June 2017 to December 2018. All of the patients had history of successful segmental scleral buckling plus 360° encircling silicone band insertion for RRD and laser retinopexy during 1 month after surgery.

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Inclusion criteria were history of successful SB for RRD, no other ophthalmologic disorders and existence of any complication due to buckling needed to buckle removal, such as buckle exposure, infection, severe diplopia, buckle migration, and severe pain.

The patients who had inclusion criteria first were informed about the study and then all volunteers signed an informed consent. Thereafter, a complete ophthalmic examination including BCVA, refraction, slit lamp examination, and ocular biometry were performed preoperatively. Previous ophthalmic documentations were evaluated and all data were recorded. Thereupon, all patients were prepared for buckle removal surgery.

After instilling of topical anesthetics drops (eye drop tetracaine 0.5%), preparation, and draping of patient in operation room was done then site and extent of buckle and band were determined based on past operational note. then local conjunctival peritomy performed at the site of buckling and adhesions released and buckle was pulled out by gentle traction through the peritomy site. After evaluation of sclera, conjunctiva was repaired by 8-0 vycril sutures. Eye drop betamethasone 1% and chloramphenicol prescribed for 5 post operational days.

A total of 1 week, 1 month, and 3 months follow-up visits were completed after buckle removal. The patient was also trained to return to clinic once visual acuity decline appeared after surgery.

When 3 months ophthalmic examination completed, BCVA, refractive error, and axial length were evaluated. Axial length measured by IOLMaster (Carl Zeiss) device in all of the patients.

Wilcoxon test using software SPSS23 was carried out to analyze changes in mean values of BCVA, spherical equivalent (SE), and axial length before and 3 months after buckle removal. *P* value <0.05 considered as significant.

Results

A total of 15 eyes of 15 patients involved in this study. Of these patients, 10 were females (66.7%) and 5 males (33.3%). The average age was 44.2 years (range: 12--62).

All of the patients had history of successful scleral buckling with encircling silicone band and laser retinopexy for RRD (nine right eyes and six left eyes). The average time from surgery to buckle removal was 18.1 months (from 3 to 60 months). All the patients underwent buckle removal because of buckle exposure and pain. Among the patients, the range of BCVA before and after buckle removal was 20/200 to 20/20. The mean BCVA before buckle removal was 0.33 ± 0.36 logMar and 3 months after buckle removal was 0.29 ± 0.33 logMar. However, statistically meaningful changes were not observed. (*P* value: 0.24).

From all patients, 13 had myopic refractive error and remaining 2 patients had no significant refractive error. The mean SE before and 3 months after buckle removal was -5.35 ± 4.15

and -5.04 ± 4.25 , respectively. There was also no significant change in refractive error postoperatively (*P* value 0.23).

Measurements of axial length showed the mean axial length (AL) before and 3 months after buckle removal as 27.19 ± 2.04 mm and 27.03 ± 2.37 mm. They could not be considered as significant changes (*P* value: 0.33). No complication or redetachment was reported postoperatively. In follow-up duration, all eyes stayed stable.

Discussion

SB has been introduced to treat RRD since 1940.^[18] This surgical technique carries extraocular pressure through the sclera which indents the sclera over the detached retina. Thereupon, changing in the globe shape is the major result which lead in refractive error and visual acuity changes.^[19,20] Although SB is pretty effective and safe extraocular surgery specifically proper for young and phakic patients; nonetheless, the existence of a few uncommon postoperative complications necessitates buckle removal.^[21-23] In addition to the risk of redetachment as a major side effect, the concern whether globe shape alterations are reversible or not still exists in buckle removal surgery. A retrospective study conducted by Rasouli *et al.* in 2012 displayed the risk of redetachment after buckle removal is very low and irrelative to prophylactic laser retinopexy.^[12] Other study by Moisseiev *et al.* reported the overall scleral buckle removal rate is 5.7% and redetachment occurs in 8.2% of patients.^[24] Another identical study performed to analyze the major consequences of buckle removal redetachment (0-33%) and infection.^[21]

As it is vivid, there is lack of studies conducted to evaluate visual acuity changes, refractive error, and axial length after buckle removal.

Nuzzi and Rossi reported that visual acuity remained stable after buckle removal without any postoperative complication or detachment.^[9] Moreover a study by Chen *et al.* carried out in 2012 aimed to analyze 23 patients after buckle removal and reported no visual acuity changes after buckle removal.^[25] It is necessary to add that in the present study myopia was the most predisposing factor for RRD (13/15). The cause of the retinal detachment in other two patients was unknown. In current study, all patients had history of segmental buckle, encircling silicone band and laser retinopexy during 1 month after surgery. All patients had history of successful SB surgery with no history of recurrence of retinal detachment in follow-up duration. Any significant visual acuity changes was not observed after buckle removal. Likewise refractive error and axial length were stable after buckle removal.

Based on results, the changes in the globe shape owing to SB are irreversible after a while. Although the exact reason for irreversibility is unknown; however, seemingly it resides in scar formation around the buckle area. There is the probability of stability of these changes in post operation period. This study bears some limitations; first limited indications for buckle removal

lead to few samples, accordingly another study with much more cases is suggested. Second, the short follow-up time matters. although the previous studies showed that 3 month can be enough to see the changes after buckle removal.

Conclusion

Buckle removal is a safe procedure without any postsurgery complication. The study verified that there is not any significant change in visual acuity, refractive error, and axial length 3 months after buckle removal.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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