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Case Report

A Case of Lens and Posterior Capsule Injury in Chandelier-Assisted Scleral Buckling for Rhegmatogenous Retinal Detachment

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Keywords

Scleral buckling · Rhegmatogenous retinal detachment · Chandelier-assisted scleral buckling · Cataract progression · Heads-up surgery

Abstract

Introduction: Rhegmatogenous retinal detachment (RRD) presents as a common ophthalmological emergency that impacts vision and may lead to blindness in the involved eye. Recently, chandelier-assisted scleral buckling (SB) is considered as one of procedures for the management of RRD. Herein, we present a case of acute cataract progression caused by a chandelier light during chandelier-assisted SB for RRD. ***Case Presentation:*** A 69-year-old male patient presented with right eye RRD. The best-corrected visual acuity (BCVA) was reduced to 20/40 in the right eye, and a retinal tear was observed at the upper temporal side with macula-off retinal detachment. The retinal tear was on the periphery, and the crystalline lens opacity was mild; therefore, the patient was treated with SB with a chandelier. Intraoperatively, posterior lens opacity was gradually observed, but it did not affect surgery. Thus, the surgery was completed as planned and retinal reattachment was confirmed. The day after surgery, the cataract had progressed, with a significantly decreased right BCVA of 20/400 in the right eye; therefore, cataract surgery was performed 2 months after the initial surgery. Because the posterior capsule had already ruptured, we performed lens extraction and anterior vitrectomy and fixed the intraocular lens with an optic capture. Postoperatively, the patient's BCVA had recovered to 20/40 in the right eye. ***Conclusion:*** SB with a chandelier is an effective treatment for visibility and educational purposes; however, several points of caution are raised. Proper care should be taken while handling the illumination in the SB.

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Introduction

Scleral buckling (SB) remains the standard treatment for rhegmatogenous retinal detachment (RRD), although vitrectomy has been increasingly used as the first-line treatment. In the recent years, chandelier-assisted SB has become popular with advances in transconjunctival microincisional vitrectomy. Performing SB under a wide-angle observation system using chandelier illumination enables the surgery to be completed under a microscope and allows for a wide area of the fundus to be observed.

SB under chandelier illumination provides clearer images than conventional SB with a binocular ophthalmoscope. Furthermore, the combination with 3D heads-up surgery has educational advantages because the surgeons and observers can share the operation view. Many cases of SB using chandelier illumination have been described in the literature [1–5], but only a few cases with complications have been reported. In addition, the procedure for SB with chandelier illumination varies widely among surgeons, and a consistent protocol has not yet been proposed. In this report, we describe a case of cataract progression due to contact with chandelier lighting during chandelier-assisted SB for RRD, suggesting the need for caution while using chandelier-assisted SB.

Case Report

A 69-year-old man presented with progressive visual field loss for 1 month and was referred for RRD. The patient's medical history included hypertension. On presentation, his best-corrected visual acuity (BCVA) was 20/40 in the right eye and 20/20 in the left eye. Both eyes had mild cortical cataracts (Fig. 1a, b); otherwise, the anterior segment was normal. Fundus examination revealed a break associated with lattice degeneration in the upper temporal side with temporal macula-off retinal detachment in the right eye (Fig. 1c, d). The fundus of the left eye was normal.

Although the patient was older, we selected SB because he only had a single peripheral retinal break. A 27-gauge chandelier-assisted SB was performed under a wide-field viewing system using the NGENUITY 3D® visualization system (Alcon, US). The superior and lateral rectus muscles were sutured with 4-0 silk ties to control the eye. A 27-gauge cannula for chandelier illumination was placed in the superior nasal sclera, and the chandelier light was inserted into the cannula. A retinal break was identified using a wide-angle RESIGHT® viewing system (Zeiss, Germany), and cryopexy was performed by scleral compression with a cryoprobe. For the buckling procedure, the eyeball was rotated with the fixed 4-0 ties (Fig. 2a). A silicone sponge (#506) was placed at 8 and 2 o'clock under the scleral sutures, which were at 1, 10, and 11 o'clock. Subretinal fluid drainage was performed at the 9 o'clock position. All procedures were performed by inserting a chandelier illumination into the cannula. During the surgery, a posterior lens opacity on the superior nasal side was detected (Fig. 2b), which did not affect the surgery. After confirming retinal reattachment, 100% sulfur hexafluoride (SF6) gas (0.5 mL) was injected into the posterior segment.

From the first day postoperation, strong lens opacity was observed, and the patient's BCVA decreased to 20/400 in the right eye, although the retina was reattached. Lens opacity did not improve; therefore, cataract extraction and intraocular lens (IOL) placement in the right eye were performed 2 months after SB. During the cataract surgery, it was confirmed that the posterior capsule on the upper nasal side had ruptured (Fig. 3a). This position suggested that the chandelier light in the previous operation could have caused the damage to

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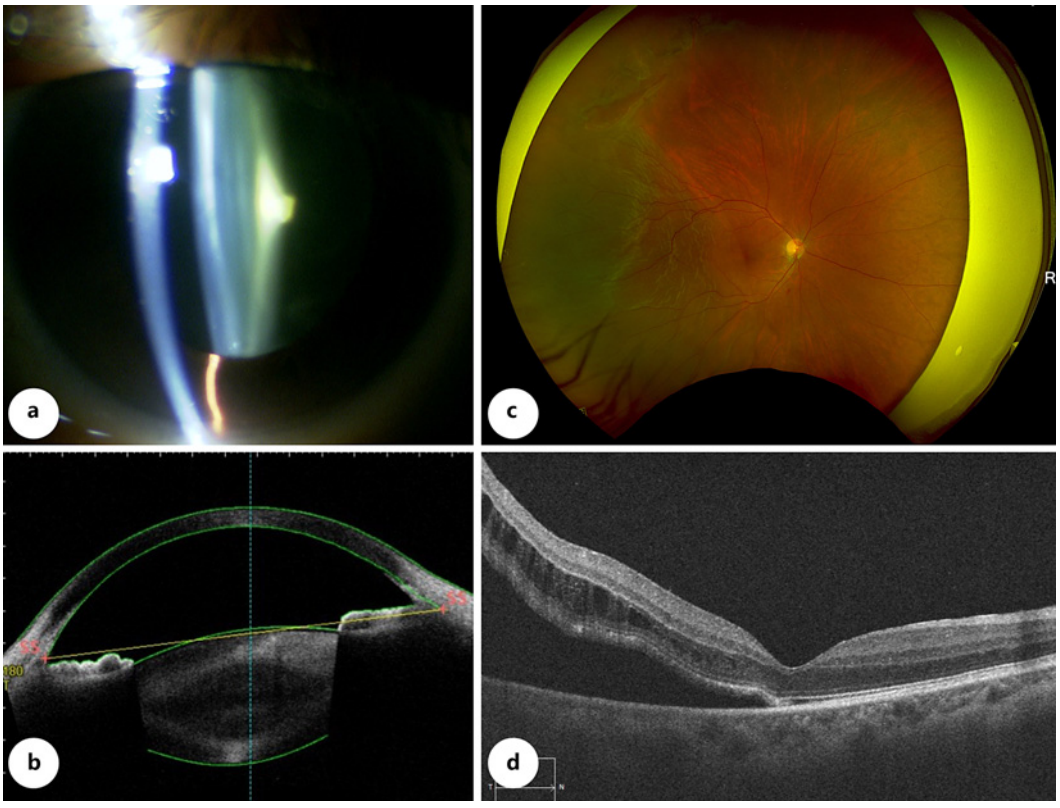

Fig. 1. Preoperative images. **a** Slit lamp examination and (**b**) anterior segment optical coherence tomography (OCT) showing mild cataract. **c** Wide-field fundus photograph and (**d**) OCT showing macula-off rhegmatogenous retinal detachment due to upper-temporal side tear.

the lens. Lens extraction and anterior vitrectomy were performed, and the IOL was fixed using optic capture (Fig. 3b). After surgery, BCVA recovered to 20/40, and retinal detachment did not recur in the right eye (Fig. 3c, d).

Discussion

In the recent years, vitrectomy has been increasingly chosen as a surgical option for RRD due to the advances in minimally invasive vitreous surgery. However, SB, which does not require vitrectomy or restriction of body position through the extraocular approach, is still an important technique. As small-incision vitrectomy has become mainstream, chandelier illumination, which is a single light source, enables wide-angle and clear fundus observation. SB under the wide-angle viewing system with chandelier illumination provides better visibility than conventional SB, which uses binoculars, with the procedure completed under the microscope. Based on the clinical presentation and the advantages of SB, we chose SB with chandelier illumination for the management of this case.

Many surgeons have performed chandelier-assisted SB since Aras et al. reported it [6]; however, only a few studies have reported the complications associated with chandelier illumination. A comparative study of conventional SB and chandelier-assisted SB showed no significant differences in the reattachment rate of RRD and visual outcome with no perioperative complications [7].

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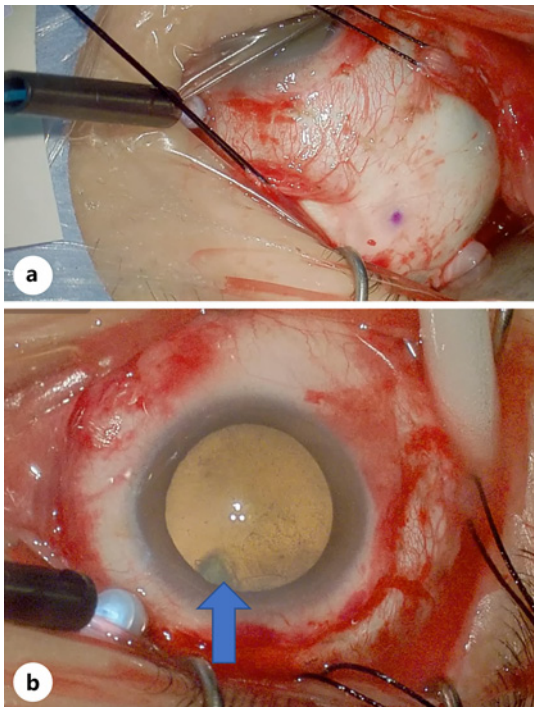

Fig. 2. Intraoperative view. **a** The eyeball was rotated for buckling suture placement. **b** A posterior lens opacity was found near the illumination.

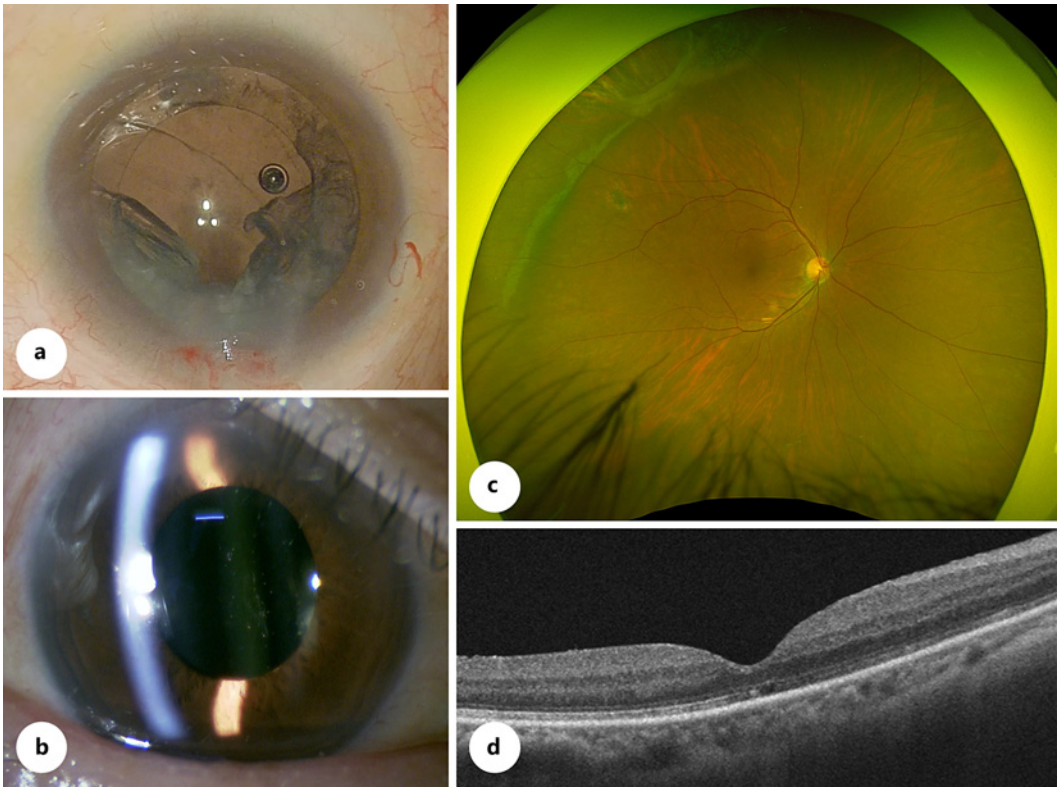

Fig. 3. Intraoperative view showing (**a**) posterior capsule rupture and (**b**) postoperative view during cataract surgery. Postoperative photographs showing (**c**) wide-field fundus photograph and (**d**) OCT after retina reattachment.

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Complications associated with the insertion of a chandelier during SB include bacterial endophthalmitis [8], lens damage [9], and iatrogenic retinal breaks [9]. Above all, postoperative endophthalmitis is a serious potential complication that can lead to loss of vision. A study by Sakano et al. [8] reported acute infectious endophthalmitis following SB with chandelier endo-illumination. The culture of the vitreous sample revealed *Staphylococcus epidermidis*, suggesting invasion of the vitreous humor by the bacterial flora of the conjunctiva. The insertion of the 25- and 27-gauge trocars is directly associated with risk of contamination in vivo according to a previous study [10]. A fluorescent microsphere of diameter 1 μm, which is approximately the size of *Staphylococcus* bacteria, was introduced into the vitreous cavity with the insertion of a 27-gauge trocar.

In our case, to prevent bacterial invasion from the chandelier insertion site, the chandelier was inserted during surgery without removal and reinsertion. Back lens opacity on the upper nasal side appeared during SB (Fig. 2b); furthermore, a posterior capsule injury at the same site was observed (Fig. 3a). Therefore, we considered that the lens injury was due to the chandelier illumination.

Since we handled just two rectus muscles, we focused our attention on their rotational movements with great care. In practice, there were no unnecessary movements. The intraoperative video showed no problems with the insertion position and angle of the chandelier light; however, the tip of the chandelier fiber might have touched the lens when the silicone sponge was sutured because the eyeball was pulled and fixed to maintain the surgical field (Fig. 2a).

There have been no reports of complications from lens contact during chandelier-assisted SB except one by Imai et al. [9]. According to their report, lens contact with the tip of the chandelier occurred in 1 of 79 eyes and caused cataracts.

Although there are many reports on SB with chandeliers, the operation procedure varies. Some describe that the chandelier is kept inserted or pulled out as appropriate, but many do not. Considering the risks of both endophthalmitis and lens disorders, we recommend the following procedures:

1. The chandelier should be removed when the eyeball rotates to avoid contact with the lens and reinserted as needed.
2. The surgical field should be washed frequently with a diluted povidone-iodine solution or polyvinyl alcohol-iodine, especially when the chandelier is removed and reinserted [11].

The 3D heads-up surgery has also been developed in the field of ophthalmology. It has several advantages, such as surgical education, wider vision, enhanced field depth, and ergonomics. A few studies have reported SB using a 3D visualizing system [12–14]. Heads-up surgery enables learning and allows the observers to identify the breaks and understand the cryopexy procedure. Thus, we chose to perform SB with chandelier illumination under a wide-field viewing system using the NGENUITY 3D® visualization system from a surgical education perspective. The opportunity to learn SB has decreased among young surgeons; therefore, heads-up SB surgery using a chandelier light is helpful for SB training.

Our report highlights the possibility of developing lens opacity complication due to the contact of the chandelier light in the chandelier-assisted SB with the lens. We further suggest that removal and reinsertion of the chandelier light may be effective for preventing this contact. Besides these, frequent sterilization of the surgical field is a must to prevent the occurrence of endophthalmitis. The CARE Checklist has been completed by the authors for this case report, attached as online supplementary material (for all online suppl. material, see https://doi.org/10.1159/000535428).

Statement of Ethics

This study was conducted in accordance with the Declaration of Helsinki. Written informed consent was obtained from the subject for the publication of this case report and the accompanying images. Ethical approval was not required for this study in accordance with the local or national guidelines.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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Author Contributions

All authors attest that they meet the current ICMJE criteria for authorship. M.K. contributed to writing and collecting the data. Y.S. performed the surgical management and contributed to the diagnosis, and the case report was his conception. E.N. participated in the design of the study and critically reviewed the results and manuscript. All the authors read, edited, and approved the final manuscript.

Data Availability Statement

All data generated or analyzed during this study are included in this article and its online supplementary material files. Further inquiries can be directed to the corresponding author.

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