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Research Article

Temporary Scleral Buckling

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Abstract

Scleral Buckling (SB) has the effectiveness in the treatment of rhegmatogenous retinal detachment (RRD) comparable to pars plana vitrectomy (PPV). At the same time SB allows not to violate the internal structures of the eye.

However, SB has a drawback: it changes the shape of the eye, which distorts refraction. We present a method of surgical treatment - temporary scleral buckling (TSB), which has the advantages of SB but allows to solve the problem of refraction. Compliance with the conditions and implementation of the stages of the declared method ensures the extraction of retinal detachment with the restoration of the eye structures almost to a natural state.

Keywords: *Scleral Buckling; Retinal Detachment; Surgical Treatment; Scleral Buckle Removal*

Introduction

Scleral Buckling (SB) is a method of treating rhegmatogenous retinal detachment (RRD), used in its modern version for over 60 years. Ernst Custodis performed the first SB in 1949, Lincoff (1965) significantly improved the Custodis procedure, in particular, he used a silicone sponge. The high efficiency of this treatment method has been proven. The rate of single surgery anatomic success was 91.7% for SB, significantly higher compared to PPV alone (83.1%). The best visual outcome was shown in the SB group, significantly greater than PPV alone or combined with buckling [1].

SB surgical methods are significantly cheaper compared to vitrectomy due to the absence of expensive equipment [2] and consumables.

However, SB has disadvantages, mainly related to disorders in anesthesia and surgical technique, as well as those caused by inflammatory phenomena and proliferation.

The only specific complication of SB is the refractive error caused by the deformation of the eyeball as an unseparable part of this method. Postoperative astigmatism is more typical for meridional buckles, while a myopic shift with circular and segmental buckles due to an increase in the anterior-posterior axis of the eye and displacement of the lens [3,4].

Methods and Results

Of 38 cases of SB the buckles were removed in 20 cases (20 eyes, n = 20 patients).

Group characteristics: age 54.8+13.5 years, gender: 11 women, 9 men.

SB was performed within 0-3 days after retinal detachment was detected. According to the classification of proliferative vitreoretinopathy (PVR), retinal detachments corresponded to B (moderate) according to updated Retina Society Classification [5].

The SB technique is standard with the use of silicone sponge buckles with a diameter of 4 or 6 mm. A special feature was the precise localization with a scleral marker. In the case of a small break, the projection of the center of the retinal defect onto the sclera was marked. In the case of an extensive break, the edges of the rupture were marked. In case of multiple breaks - each of the defects. The meridians of the application of stiches fixing the buckle to the sclera were indicated in the operation protocol.

Laser photocoagulation (LPC) was performed 1 - 1.5 months after buckling, a diode laser with a wavelength of 815 nm was used. Such a laser creates a rougher retinoscleral scar compared to a green laser.

Performing LPC earlier than one month after surgery was painful. It was because of after surgery inflammation. In terms of timing, this period corresponds to the II-th phase - reparation. Proliferative (also called "Reconstruction") phase or formation and maturation of granulation tissue, characterized by the migration of fibroblasts, the formation of collagen and the main tissue, the new formation of blood vessels and the development of granulation tissue at the site of the tissue defect. This phase begins on the 1st day after injury and lasts on average for 2 - 4 weeks.

When the IIId phase (maturation and remodeling phase) is over, the scar reorganization becomes possible for removing the buckle.

The barrier of the retinoscleral scar after LPC should completely surround the retinal defect, including the periphery.

Removing of the buckle was performed under local epibulbar and infiltration anesthesia. The conjunctiva, the Tenon's membrane and the buckle capsule were dissected above the stitch. The stitches and the buckle were removed. The cavity of the buckle was treated with a povidone iodine solution. The conjunctiva was sutured.

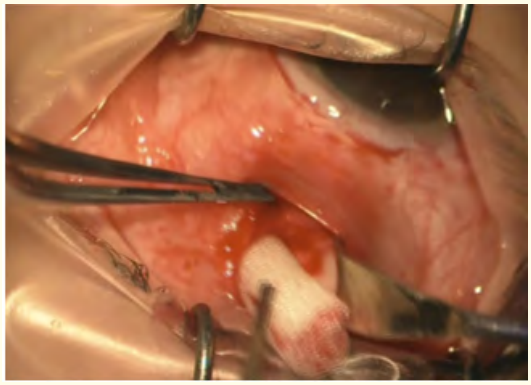


Figure 1: Removing the buckle.

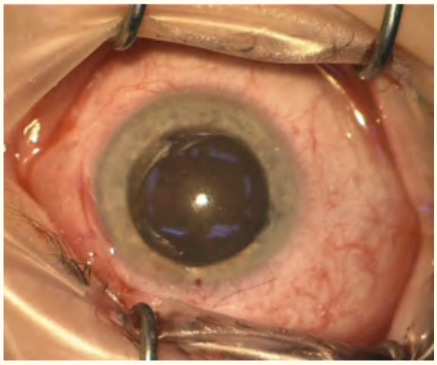
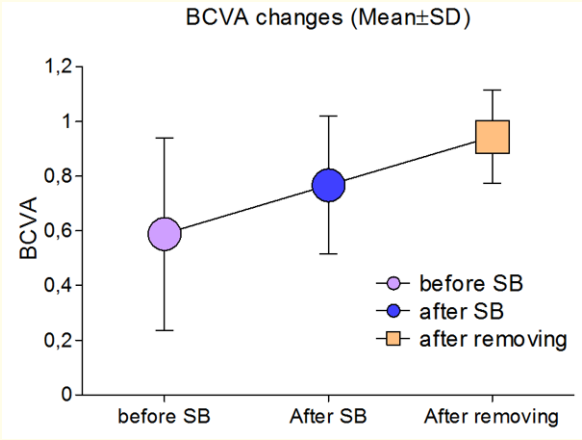


Figure 2: The eye at the end of the surgery.

The criteria for evaluating the results were refraction, measured by an automatic refractometer, and the best corrected visual acuity (BCVA).

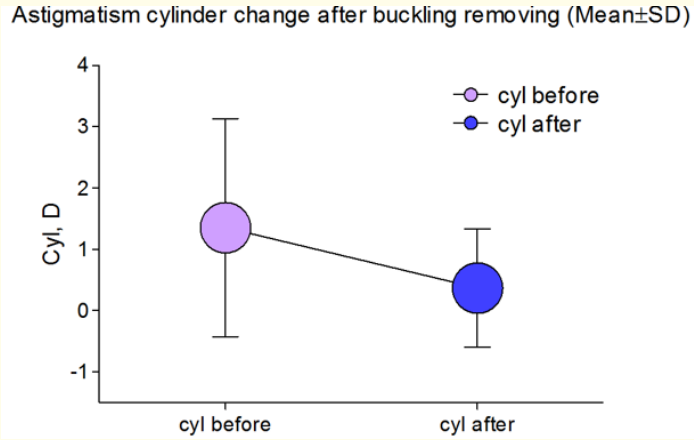
The reliability of differences was assessed by using the paired Student's t-test.



Graph 1: Differences in best corrected visual acuity before the treatment, after SB and after removing the buckle.

BCVA, before SB for retinal detachment was 0,59 ± 0,35 (N ± σ), and 2-3 months after SB it was 0,77 ± 0,25 (N ± σ) (t-test -3,23, at $p < 0,01$), and after buckle removal 0,94 ± 0,17 (t-test -2,21, at $p < 0,05$). The increase in BCVA is statistically significant both after buckling for a retinal detachment and after the buckle removal if compared to the state after buckling.

The increase in BCVA after removing the buckle can be explained by the fact that astigmatism at the buckle presence was irregular. The deformation of the eyeball was asymmetrical and eccentric and could not be fully corrected with spectacle lenses.



Graph 2: Astigmatism changes before and after buckle removing.

Astigmatism before removing the buckle was 1,35 ± 1,78, but after removing it decreased to 0.37 ± 0,97. The decrease in astigmatism is statistically significant (reliable): (t-test -3,4, at $p < 0,01$).

Types of buckles	Total by type	Removed from them	% of buckles removed by each type
Circular	6	1	17%
Circular and meridional	3	1	33%
Meridional	14	9	64%
Segmental	14	9	60%

Table 1: *The distribution by types of buckles.*

Analysis of this table shows that local buckling was performed significantly more often and also removing significantly more often. This is due to the "freshness" of the detachments.

Average time for removing the buckle is 5,12 ± 2,6 (N ± σ) months.

Time of removing	Quantity
3 - 4 months	8
5 - 6 months	7
> 6 months	5

Table 2

In the first patients, removal was performed much later, mainly in the presence of astigmatism or subjective discomfort from the presence of buckles. Later, it was discussed in advance and planned in a shorter time.

Cost calculation: The total cost of surgical treatment with SB in our clinic was reduced by 43% compared to a single vitrectomy. In addition, intraoperative or delayed lens replacement, which often accompanies vitreous surgery, is not taken into account.

Discussion

The study did not record subjective complaints or mild ptosis. However, it is worth nothing that most patients with a buckle were concerned about the narrowing of the eye slit ("the eye became smaller"). Patients usually got used to this condition. The joy of preserved vision apparently compensated for the discomfort. Removing the buckle allowed them to compare the sensations with the buckle and without it. After the buckle removal, patients described their sensations with the following phrases: "the eye felt better", "the field of view expanded", «the eye stopped being alien".

A case of removing a circular extrascleral buckle against the background of anterior proliferation (PVR st.C ant.) should be considered separately. Patient S., 66 y.o. Circular episcleral buckling was performed due to recurrent RRD in combination with vitrectomy, basal vitreum shaving and silicone tamponade. Retinal adhesion was achieved. Considering the presence of severe discomfort and pain from the circular buckle and the presence of grade 3 ptosis, after discussion with the patient, the silicone oil was removed and the circular buckle was removed 1 month later. After removing the circular buckle, retinal detachment recurred, requiring retinotomy with repeated silicone oil tamponade. Apparently, the presence of C- stage PVR is a contraindication to buckle removal.

Conclusion

1. If the conditions are met, the scleral buckle can be removed. Indications for temporary scleral buckling are:

   a) Surgery at the right time at PVR stage A-B,

   b) Precise localization of retinal defects,

   c) Rough barrier PLC around the break.

2. The recommended interval from ESP to BLK is 1 - 1.5 months, the buckle removal is at least 2.5 months.

3. TSB provides a higher functional result in visual acuity and astigmatism and eliminates subjective discomfort compared to maintaining a permanent scleral buckle.

The money savings was 43% compared to the PPV approach to the treatment of retinal detachment. Without taking into account the introduction removal of silicone oil and surgical treatment of cataracts or removal of a transparent lens.

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