

Atypical Indication of Scleral Buckling in Primary Rhegmatogenous Retinal Detachment

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Abstract

An optimal surgical solution for primary rhegmatogenous retinal detachment (RRD) is the subject of discussion. There are certain surgical methods available such as scleral buckling, pars plana vitrectomy (PPV), pneumatic retinopexy and combinations of these.

Scleral buckling is considered to be the first-choice of surgical techniques in uncomplicated phakic primary rhegmatogenous retinal detachment cases, especially in young patients with clear optic medias with absent or mild proliferative vitreoretinopathy. After a reliable evaluation of a complex preoperational finding, scleral buckling can be efficient option in some atypical indications as well. Also, using scleral buckling, some primary PPV risks can be avoided as well. The goal of this retrospective study is to present certain procedural advances and post-operative outcomes of primary rhegmatogenous retinal detachment repairs performed at our clinic and the use of scleral buckling out of typical indications ranges. The topic is hereby discussed using three short case reports. Despite the successful use of the PPV technique, vitreoretinal surgeons should maintain and develop their scleral buckling skills considering the expected growth in primary RRD incidence.

Keywords: Scleral buckling; Retinal detachment; Indications; Surgical therapy

cases in which the scleral buckling treatment was used for primary RRD out of range of traditional indications.

Introduction

Primary rhegmatogenous retinal detachment (RRD) is a vitreoretinal disorder with an incidence of 6.3-17.9 per 100.000 inhabitants [1] that endangers the vision of patients such that it ranks among ophthalmological emergencies. The most frequent and consequential complication arising with RRD is proliferative vitreoretinopathy (PVR), with an incidence of 5.1%-11.7% [2,3]. The optimal surgical treatment for RRD is the subject of discussion. There are certain surgical methods available such as scleral buckling, pars plana vitrectomy, pneumatic retinopexy and combinations of these.

In the past few decades, a number of clinical studies comparing several surgical algorithms and their outcomes, the incidence of post-operative retinal re-detachment and long-term visual and anatomical outcomes have been published [1,2,4,5]. Scleral buckling is considered to be the reference surgical technique in uncomplicated phakic primary rhegmatogenous retinal detachment cases, especially in young patients [2,4,6] (Figures 1 and 2). Primary PPV is the method of choice in pseudophakic and aphakic RRD cases as it offers a number of potential advantages with its short operation time, more precise retinal defect diagnostics, higher re-attachment success rate with a single surgery and better anatomical outcomes [5]. PPV is also the method of choice in complicated RRD cases involving choroidal detachment, ocular hypotony, proliferative vitreoretinopathy, large breaks or giant retinal tears [7]. Pneumatic retinopexy should especially be used in cases of primary RRD with atrophic retinal defects with no or minimal PVR [4].

However, determining the ideal method sometimes depends on the individual surgeons and their intuition as opposed to only evidence-based recommendations. The aim of this paper is to present certain

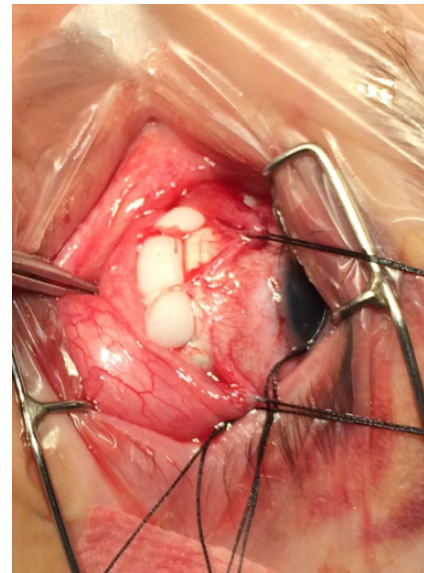


Figure 1: Implantation of the segmental scleral buckle

Patients and Surgical Approach

The scleral buckling surgery was performed on 712 eyes of 705 primary RRD patients at the Department of Ophthalmology of the University Hospital in Pilsen from 1st January 2010 till 31st March 2017. 295 people in this patient group (41.8%) were women and 410

(58.2%) were men, with a mean age of 59.9 years (median 62 years). All surgeries were performed by two surgeons. In 582 eyes (81.7%) primary PPV was performed, in 45 eyes (7.7%) PPV was combined with 360-degree encircling or segmental scleral buckling, in 75 eyes (12.9%) PPV was combined with cataract surgery. In 53 eyes (9.1%) retinal re-detachment requiring a rePPV procedure was observed.



Figure 2: Radial scleral buckle

Scleral buckling was primarily used in 110 eyes (15.5%), of which secondary PPV had to be performed in 16 due to persistent retinal detachment or re-detachment. Pneumatic retinopexy was used as a primary surgical treatment in 20 eyes (2.8%), 2 of which (10%) required secondary PPV (Figure 3).

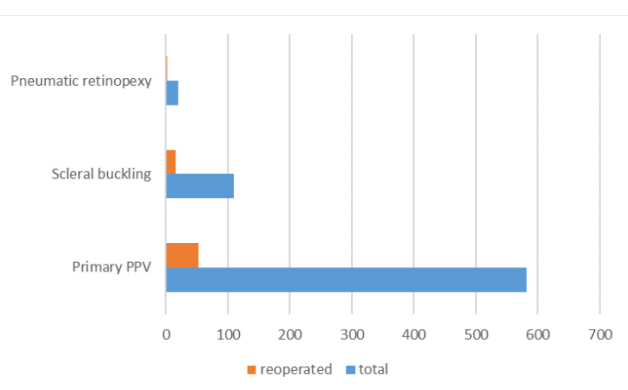


Figure 3: Surgical approach and reoperation incidence

Case 1

Pseudophakic retinal detachment with multiple defects

A 58-year-old emmetropic male patient presented in 2007 with left eye blindness and underwent the PPV surgery with silicon oil implantation due to his pseudophakic rhegmatogenous retinal detachment elsewhere two years prior. After the silicon oil removal, retinal bleeding appeared and was successfully resolved by a second PPV surgery. Because of the secondary glaucoma development, a series

of glaucoma surgeries were also performed. Nevertheless, glaucomatous atrophy of the optic disc occurred.

The patient came with macula-on pseudophakic retinal detachment with two defects in the only seeing right eye. His central visual acuity was 1.0. Scleral buckling was performed in January 2010. The post-operative course was uncomplicated requiring only a temporary use of glaucoma monotherapy. The final best corrected visual acuity remained unchanged. The follow up period has been 102 months during the follow up period no eye-related complications (except refractive error change) occurred.

According to his pseudophakia, the age of the patient and the multiple retinal defects, PPV would be the best method of choice on the right eye. Due to the complicated course after the PPV on the left eye and the secondary glaucoma development, we decided to use the technique of scleral buckling in combination with cryosurgery on the right eye.

Case 2

Phakic myopic male patient in his middle age

A 51-year-old highly myopic man sought help due to rhegmatogenous macula-on retinal detachment of his left eye. His initial central visual acuity was intact (1.0). Radial segmental scleral buckling and external subretinal fluid drainage was performed in January 2015. Subsequently, the patient used antiglaucomatous therapy due to secondary glaucoma in the post-operation period. Two months after the first surgery in March 2015, encircling scleral buckling and cryopexy with SF6 100% injection was performed due to retinal re-detachment with an inferior retinal tear and vitreous bleeding. Laser coagulation of the retinal defect on the cerclage ridge was performed repeatedly. His final best corrected visual acuity was 0.8, due to the scleral buckling the refractive error has changed. The follow up period after the second surgery has been 40 months and no other eye-related complications were observed.

According to the patient's age and high myopia, PPV surgery with silicon oil implantation would have been the preferred treatment, however, the patient's will was to preserve the near distance vision, which was the reason for choosing scleral buckling. Despite the complicated post-operative course due to the retinal re-detachment, the less invasive surgical method was chosen, which led to the desired results.

Case 3

Aphakic middle age male

A 41-year-old male after bilateral congenital cataract surgery with left eye phthisis and right eye aphakia and amblyopia suffered from rhegmatogenous macula-on retinal detachment with developing PVR in his right eye. His visual acuity was 0.6. A scleral buckling procedure with a 360-degree encircling band and cryoretinopexy was performed in combination with vitreous strands dissection using the pars plana approach in October 2016. His final best corrected visual acuity remained unchanged and his macular anatomy with vitreomacular interface was not altered. The follow-up period has been 21 months, during this period no eye-related complications (except refractive error change) were observed.

Regarding the patient's age, aphakia and developing PVR, primal PPV would have been the method of choice, however, in a young patient with an already altered anatomical structure, we were concerned about post-surgical complications, such as macular atrophy and secondary glaucoma worsening if we used a more invasive technique.

Discussion

Primary rhegmatogenous retinal detachment incidence is 6.3-17.9 per 100,000 inhabitants [1]. The myopia prevalence among primary RRD patients is 47.28% (\pm 12.59) [1]. The incidence of myopia is rising worldwide, about 1.406 billion people (22.9% of global population) suffered from myopia in 2000, according to the latest studies, predicting a rise of up to 4.758 billion people by 2050, among them 938 million with high myopia [8]. It can be presumed that, coinciding with the myopia incidence growth, the incidence of retinal detachment will rise as well.

The surgical treatment regimen of primary rhegmatogenous retinal detachment are highly individualized, with the surgeon considering the preoperative status (detachment extension, lens status, number of retinal breaks, PVR grade, etc.) and the patients' characteristics (age, compliance, general health), as well as the surgeon's skill and experience. The aim of each procedure is to re-attach the detached retina and to avoid possible further complications, such as a PVR occurrence, secondary macular hole or retinal atrophy, secondary glaucoma, etc. The most frequent techniques used in the surgical treatment of RRD are scleral buckling and pars plana vitrectomy or a combination of both. The anatomic success rate of these surgical techniques is in the range of 85%-91% [9]. The scleral buckling method was introduced for the first time in 1957, PPV appeared in 1976 [9]. In the past few decades, the tendency to prefer the PPV method for solving primary RRD has been observed as a result of the development of microsurgical approaches (23 G and 25G PPV) and modern imaging methods [2]. Another argument for the preference of the PPV method is the longer learning curve with scleral buckling. However, the learning process these days can be facilitated by replacing the indirect ophthalmoscope with chandelier endoillumination and the contactless viewing system under the operating microscope (commonly used in classical PPV).

In solving RRD, scleral buckling is usually used in younger phakic patients with minimal or no PVR, transparent optical media and well-identifiable retinal defect(s). In phakic patients, the advantage of the scleral buckling procedure, in comparison to PPV, is a better post-surgical BCVA and a lower incidence of cataracts [2,10] as well as a lower procedure cost [11]. Nevertheless, scleral buckling may be connected with a higher risk of the development of post-surgical proliferative vitreopathy [12].

PPV is the method of choice in patients with pseudophakic and aphakic RRD, with posterior placed retinal defects and giant retinal tears, and also in cases with opaque optical media or complex retinal pathology [2,7,9].

In patients presented in our cases above, the procedure of choice would be primary PPV. Nonetheless, despite the recommended procedure, we chose scleral buckling as a less invasive surgical treatment. In the Case 1 patient, there was a post-operative complication concern due to the complicated ocular history of the fellow eye (mainly for the refractory secondary glaucoma occurrence). In the Case 2 patient, preserving the high-quality near vision was

crucial for the occupational reasons of the patient. There was a fear of retinal atrophic changes and a rapid cataract progression when using the PPV method. In the Case 3 patient, the less invasive procedure was chosen in an effort not to significantly damage the already impaired anatomical condition of the eye. In all three cases, our goal has been achieved, i.e. to re-attach the retina, to preserve the pre-operative vision and to avoid certain risks related to the PPV method. No serious eye-related complications of scleral buckling (such as scleral buckle extrusion or intrusion, infection, globe ischemia or choroidal detachment) [13] were observed during the follow-up period.

Conclusion

In solving primary RRD, the scleral buckling method is usually used in young phakic patients with no or minimal PVR, with transparent media and well-identified retinal defect(s). After a thorough preoperative evaluation, scleral buckling appeared to be optimal even in atypical indications in order to avoid some of the risks linked to PPV. Considering the expected growth of primary RRD incidence in connection with the growth of myopia prevalence, vitreoretinal surgeons should make concerted efforts to keep developing the scleral buckling techniques, use them in combination with new technologies (i.e. endoillumination) and not perform the PPV technique excessively.

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