CEOTI
Clinical and Experimental Ocular Trauma and Infection

Original Article
Clin Exp Ocul Trauma Infect. 2022;4(1),6-10

Anatomical and Functional Outcomes of Scleral Buckling for Rhegmatogenous Retinal Detachment Surgeries

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Abstract

Purpose: The aim of the study is to analyze the anatomical and functional outcomes of scleral buckling surgeries for non-complicated rhegmatogenous retinal detachment surgeries.

Materials and Methods: This was a retrospective analysis 2602 cases that underwent scleral buckling for the repair of rhegmatogenous retinal detachments. The study was conducted at the ophthalmology department of Lahore General Hospital from 2003 to 2015. Pre-operatively patients were assessed and data collected for age, refractive error, the status of the intraocular lens, proliferative vitreoretinopathy, number and morphology of breaks, type of buckling procedure. Post-operatively best-corrected visual acuity and reattachment rates were observed.

Results: A total of 2602 patients with primary rhegmatogenous retinal detachment who underwent scleral buckling repair were included in the study. The mean age was 30.2 ± 15.6 years (range 3 - 69). 73% of patients were pseudophakic, 17% were aphakic and 10% were phakic. Myopic refractive error less than 6 diopters were present in 75% patients and 25% had more than 6 diopters. Out of 73% of pseudophakia patients, 341 ± 114.6 patients had eventful cataract surgery done before the procedures with a posterior capsular defect. Majority of patients 878 ± 46.7 had proliferative vitreoretinopathy grade B. 65% of patients had a single break. In terms of anatomical location 271 ± 87.3 had superior breaks, 197 ± 63.4 had temporal breaks, 137 ± 51.2 had inferior breaks and 64 ± 13.2 had nasal breaks. Morphologically the majority had a horseshoe-shaped break. In terms of buckling procedures, 58% of patients underwent segmental buckle, 12% underwent complete encirclement and 30% had a combined procedure. 397 eyes had to undergo a redo surgery, pars plana vitrectomy with oil. Best corrected visual acuity ranging from finger counting to 6/9 on Snellens was achieved by 89% of the treated eyes.

Conclusion: Primary rhegmatogenous retinal detachment surgery utilizing scleral buckling operation achieves high anatomical and functional success rates.

Keywords: retina, detachment, vitrectomy, surgery, scleral buckling

Introduction

First ophthalmoscope was invented by Helmholtz in 1850 and was effectively used for retinal examination. Coccius and von Graefe 2years after this discovery accurately described the retinal breaks (1,2). The retina has been viewed by different instruments throughout the next century. In 1947, first binocular indirect ophthalmoscope was used by Schepens and since then has changed little. Ernst Custodis was the first person to perform scleral sponge exoplant

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surgery about 6 decades ago (3). After Charles Schepens, the modern era of scleral buckling began. Harvey Lincoff was the first one to use cryotherapy for retinal detachments (4). Further research developed with time and Gonin, later on, described the external tamponade procedure followed by drainage of retinal fluid. His results demonstrated improved success rate of tamponade for closing retinal breaks and repairing detachments.

Scleral buckling technique for retinal detachment is considered hectic and challenging due to its complex technicalities but it has low incidence of associated complications. Furthermore, the cost of this surgery is low and the results are similar to pars plana vitrectomy. However it does have a prolonged surgical time (5,6). The surgical outcomes for this technique are based on many factors such as surgical skills of the surgeon, the nature of retinal detachment, patient's condition, presence or absence of PVD, grade of PVR and initial onset of detachment till the time of surgery to name a few. The basic technique has three major components including the localizing the break, break closure and draining the retinal fluids. There have been improvements to the routine scleral buckling technique. Aras et al, explained the use of chandelier-assisted surgery that has more advantages. These benefits include reduced surgical time, facilitation of tissue's bimanual manipulation and improved handling of instruments. This is primarily due to improved retinal visualization (7). Retinal detachments are being studied and refined by many vitreoretinal surgeons in order to expand the role of pars plana vitrectomy for the treatment (8). Pseudophakic and aphakic retinal detachments are more and more operated by primary vitrectomy as a first-line treatment option. There are certain advantages such as the ability to drain the subretinal fluid directly, direct application of endolaser and retinal flattening with use of endotamponade. The surgeon can further improve retinal visualization by removal of cataracts or other media opacities (9).

In this analysis of our scleral buckling cases, we have shared the results of cases done in the last eleven years for rhegmatogenous retinal detachments, their success rate and the complications associated with scleral buckling.

Material and Methods

A retrospective review of 2602 patients with rhegmatogenous retinal detachment who underwent scleral buckling repair from January 2003 to December 2015 at Lahore General Hospital. All selected patients underwent standard scleral buckling techniques with or without external drainage. In terms of buckling procedures, 58% of patients underwent segmental buckle, 12% underwent complete encirclement and 30% had a combined procedure (encirclement with a segmental exoplant). 397 eyes had to undergo a redo surgery, pars plana vitrectomy with oil. Both local and general anesthesia was employed, depending upon the age of the patient in younger patients general anesthesia was given whereas others were given a local anesthesia. All patients demographic data, pre-operative retinal findings, refractive error, lens status, number and location of breaks, extent of detachment, grade of PVR, site of explant and type of procedure were all documented and recorded in preformed proformas. The surgeries were performed by different vitreoretinal surgeons at the department and all data collected. We analyzed this data and compiled the results so as to get a picture of the functional and anatomical outcomes.

Results

A total of 2602 patients with rhegmatogenous retinal detachment were included in the study, out of which 1856 were males and 846 females. The mean age was from 3 to 69 years. Pseudophakic patients were 1528, aphakic were 813; and 361 patients were phakic. Myopic refractive error less than 6 diopters were present in 1870

patients and more than 6 diopter myopes were 812. A posterior vitreous detachment was present in 977 subjects and 1725 had no posterior vitreous detachment. Out of 1528 patients, 439 had an eventful surgery in the form of posterior capsular rupture during surgery. Proliferative vitreoretinopathy was graded and PVR A was found in 754 patients, B in 1202 patients and C in 746 patients.

Single break was found in 1238 patients and rest had multiple breaks. Two breaks were present in 729 patients, three in 319 and 225 patients had four breaks or more, which were located pre and per operatively. As far as location was concerned superior break was present in 1020 eyes, temporal in 913 eyes, inferior in 526 eyes and 243 eyes had a nasal break. Retinal dialysis was present in 191 patients. The shape of the break was also documented, horseshoe-shaped breaks were present in 1409 patients and round hole were present in 1193 patients.

All the patients underwent different surgical procedures 1338 patients had a segmental buckle, 199 patients had complete encirclement, the combined procedure (encirlement and a segmental exoplant) was done in 1064 eyes. Only 272 eyes had their subretinal fluid drained.

In 2205 patients the primary surgery was successful and retina attached, 397 patients underwent re-do surgery with pars plana vitrectomy and oil, out of which 321 were successful and 97 failed to attach. Best corrected visual acuity achieved in treated eyes was from counting finger to 6/9 on snellens
acuity chart.

Discussion

Pseudophakic retinal detachments have been treated with many techniques in the past. In a comparative analysis of the different types of surgeries for retinal detachment done by Benson et al in 1997 concluded that the scleral buckling procedure was preferred by 62% of surgeons. 30% among these surgeons preferred pneumatic retinopexy over other methods while only 7% preferred the use of pars plana vitrectomy (10). Pars plana vitrectomy was not used frequently and preferred by surgeons back then but nowadays, advancement in surgical treatment and ease has increased its popularity. An increased rate of preference for treating retinal detachments without scleral buckling from the year 2005 to 2013 onwards was observed among surgeons as researched by a survey conducted by Preferences and Trend (PAT) in 2013 (11). The American Society of Retina Specialists also preferred vitrectomy without scleral buckling. An increased rate of 60% from 30% was recorded by researchers between the years 2005 to 2013 for the use of vitrectomy without scleral buckling. Also, the use of scleral buckling dropped to 10% from 25% in this time frame. More over pneumatic retinopexy method of treatment for retinal detachments has also decreased in the past few years (12). Nonetheless, Scleral buckling is still one of the two preferred methods used for treating retinal detachments. The main reasons for pars plana vitrectomy adaptation is the ability to visualize the posterior hyaloid membrane, vitreous and ease of localizing and treating the breaks. Internal illumination and scleral indentation are advantageous while using PPV and accompanied by its wide-angle imaging system, the visualization of structures is focused and enhanced at a microscopic level and good visualization of peripheral fundus (13-15).

The use of scleral buckling is declining rapidly worldwide primarily due to the lack of training centers and gradual decrease in vitreo-retinal surgeons performing the technique. It’s a lost art that though time consuming and skill demanding is a very cost effective and permanent method of treatment with very low revision rates as demonstrated by our study. The initial success rates are even comparable to vitrectomy as shown by our results (16,17). In our study we obtained a

78.8% success rate in primary surgery.The main advantage of scleral buckling is very low rates of revision as shown by our results in which only 397 eyes had to undergo revision surgery. The other advantage was the option of exercising the internal approach since previous manipulation was done externally. This helps attaining better outcome in revision surgeries. Scleral buckling also helps in addressing multiple breaks with a single approach as segmental and encirclement can cover multiple breaks that are adjacent to one another in different clock hours. As shown by our study majority of the operated eyes had multiple breaks. Adjusting the length and location of the breaks we were able to cover the breaks externally resulting in retinal repositioning.

Visual improvement in retinal surgeries is dependent on many factors the most important being the time from initial presentation and surgery. In our cases over the course of time best corrected visual acuity ranging from finger counting to 6/9 on Snellens was achieved by 89% of the treated eyes. This correlates with several other results in literature. Hu et al documented improvement of best-corrected visual acuity in 44% to 72% cases. Similarly, Mendrinos et al. found a BCVA of 20/40 in 56% cases of their research using scleral buckling. The increased rate of BCVA was recorded by them where the macular association was absent (69.6%) as compared to patients that had some extent of macular association (38.6%) (18,19). The real benefit of scleral buckling is the very low cost incurred on the patient and hospital. The cost benefits as compared to vitrectomy as huge and this is especially helpful in our setting where financial constraints are the biggest hurdle in retinal surgery (20). Over the course of the decade we were able to achieve a high volume based on the fact that the procedures do not require complex viewing and operating systems. Our team of surgeons was able to carry out multiple surgeries simultaneously and achieve comparable results to the internal approach.

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