ScleralBucklingVSPars Plana Vitrectomy:World's Perspective

ABSTRACT:

Objective: Theobjective is to find out the preferred surgical approach of retinal surgeons from different part of the world for the management of rhegmatogenous retinal detachment.

Material and Method: We did a survey via a questionnaire regarding the management of rhegmatogenous retinal detachment whether retinal surgeons prefer scleral buckling or pars plana vitrectomy for rhegmatogenous retinal detachment. This survey included 109 retinal surgeons from 18 different countries across the world.

Results: Out of 109 surgeons, 91.7% surgeons perform scleral buckling. The monthly number of buckling surgeries was 5 or less than 5 for 68.8% retinal surgeons while 22% said that they do more than 5 scleral buckling. Scleral buckling was the procedure of choice for 85.3% surgeons if a detachment fits in for the criteria of buckling. In comparison of buckling, vitrectomy was preferred by 66% retinal surgeons while 41.3% surgeons said that they would perform scleral buckling. The number of vitrectomies was 5 or less than 5 for 28.4% retinal surgeons, 17.4% do more than 5 while 33% do not perform vitrectomy. The number of vitrectomies per month for all sort of rhegmatogenous retinal detachment was 5 or less than 5 by 75.2% surgeons while more than 5 vitrectomies was done by 7.3%surgeons.

Conclusion: In this study we concluded that most of the retinal surgeons prefer scleral buckling as the procedure of choice for rhegmatogenous retinal detachment than vitrectomy as it gives a higher anatomical success rate with less pre- and post-operative complications.

Key Words: Rhegmatogenous retinal detachment, scleral buckling, pars plana vitrectomy.

INTRODUCTION:

"Rhegmatogenous retinal detachment (RRD) is a potentially blinding condition that occurs when the inner neurosensory retina separates from the outer retinal pigment epithelium due to a breach in the sensory retina's structural integrity"[1]. The creation of a retinal break, vitreoretinal traction, and liquefied vitreous entry through the breach results in primary rhegmatogenous retinal detachment[2]. Rhegmatogenous retinal detachment has a prevalence of 6.3 to 17.9 per 100,000, with those in their sixties having the highest incidence[1, 3]. Most rhegmatogenous retinal detachments led to full retinal detachment and vision loss in the affected eye prior to the period of scleral buckling (SB). Scleral buckling was developed in the 1950s, allowing surgeons to treat rhegmatogenous retinal detachment surgically.

Even after the advent of pars plana vitrectomy (PPV), which was introduced as a new treatment option by Robert Machemer[4],scleral buckling had been the standard technique for rhegmatogenous retinal detachment for several decades, and pars plana vitrectomy (PPV) was considered as a supplemental procedure to scleral buckling in complicated cases, such as proliferative vitreoretinopathy (PVR). "Evolution of vitrectomy machines and related instruments has significantly increased the number of pars plana vitrectomies in recent years" [5-9].

"There have been several clinical trials comparing the two methods"[10-15].The scleral buckling vs. primary vitrectomy in rhegmatogenous retinal detachment (SPR) study[15]was the largest randomized clinical trial, and it showed that anatomic and functional outcomes of the two methods were comparable. "Apparently, pars planavitrectomy (PPV) has become more popular as the primary procedure for management of rhegmatogenous retinal detachment. Scleral buckling is sometimes considered an uncomfortable outdated operation for the surgeon compared to pars plana vitrectomy (PPV), as it required more anesthesia and repeated taking on and off the indirect ophthalmoscope. In addition, scleral buckling might induce change of refractive errors or diplopia postoperatively. Nevertheless, scleral buckling has apparent merits over pars plana vitrectomy (PPV) in selected cases". [15]

The purpose of this study is to summarize the latest reports on the management of rhegmatogenous retinal detachment and to suggest management guidelines for choosing a surgical method in patients with rhegmatogenous retinal detachment.

MATERIALS AND METHODS:

We did a survey regarding management of rhegmatogenous retinal detachment whether retinal surgeons prefer scleral buckling or pars plana vitrectomy for rhegmatogenous retinal detachment.We gave questionnaire consisting of six questions to 109 retinal surgeons from 18 different countries like Europe,America,and Asia etc.The aim was to design a questionnaires that was logically structured and worded to not influence the surgeon's answer.

RESULTS:

In this study, 109 retinal surgeons participated from 18 different countries. Out of 109 surgeons, 91.7% surgeons perform scleral buckling while 6.4% do not perform buckling.The monthly number of buckling surgeries was 5 or less than 5 for 68.8% retinal surgeons while 22% said that they do more than 5 scleral buckling for rhegmatogenous retinal detachment in a month.When asked about the scleral buckling being the procedure of choice if a detachment fits in for the criteria of buckling, 85.3% surgeons responded positively while 11.9% surgeons does not consider scleral buckling as a procedure of choice even if the detachment fits in the buckling criteria. In comparison of buckling, vitrectomy was preferred by 66% retinal surgeons while 41.3% surgeons said that they would perform scleral buckling.

While answering a question, 28.4% retinal surgeons said that they do 5 or less than 5 vitrectomies for rhegmatogenous retinal detachment that fits in criteria of scleral buckling in a month, 17.4% said that they do more than 5 vitrectomies and 33% said that they do not perform vitrectomies for rhegmatogenous retinal detachment that fits in criteria of scleral buckling while 16.5% did not answer the question.The number of vitrectomies per month for all sort of rhegmatogenous retinal detachment was 5 or less than 5 by 75.2% surgeons while more than 5 vitrectomies was done by 7.3% surgeons in a month.

DISCUSSION:

Management of rhegmatogenous retinal detachment has evolved over many years. Trans-scleral cautery with 50% success rate was done by Jules Gonin about a century ago. With further advances, procedures like scleral buckling by Charles Schepens and pars plana vitrectomy by Robert Machemer were introduced with a success rate of 90%. Despite the progress in the management of retinal detachment, there is still a disagreement regarding which approach or combination of approaches is best surgical intervention. In this article, we surveyed 109 retinal surgeons from 18 different countries to know there surgical preferences.

With increasing sophistication of smaller-gaugetransconjunctivalsuturelessvitrectomy, viewing systems, vitreous substitute preparations and endolasers, PPV continuesto gain popularity in the management of RRDs.[16]Vitrectomy has advantages in terms of lower incidence of choroidal detachment, hypotony, diplopia or strabismus. However, in patients with rhegmatogenous retinal detachment associated with subretinal proliferations requiring vitrectomy with subretinal surgery may be associated with significant intraoperative complications including choroidal or retinal hemorrhage, subretinal air, and unplanned extension of the retinotomies. Furthermore, after vitrectomy, long-term intraocular tamponade with silicone oil or C3F8 is required. Intraocular tamponade can cause considerable lens opacity, necessitating cataract surgery in these patients, who are often young. Thus, it is a preferred procedure in a pseudophakic eye as there is no risk of vitrectomy-induced cataract afterwards.

Surgical management of eyes with rhegmatogenous retinal detachment associated with proliferative vitreoretinopathy (PVR) depends on the location and extent of membranes. Pars plana vitrectomy is needed for eyes with posterior and extensive anterior epiretinal proliferations with or without subretinal strands to remove the contractile membranes and release the resultant retinal shortening. Wallyn and Hilton[17] reported retinal reattachment rate of 95% with scleral buckling surgery in 20 eyes with isolated subretinal proliferation. Similarly, Yao et al[18]reported results of scleral buckling surgery in 40 eyes with rhegmatogenous retinal detachment and subretinal proliferation. Four eyes in their series had a small local preretinal membrane but without evidence of a starfold. In two eyes, the retina was not reattached after buckling and vitrectomy was performed. The single surgery anatomical success was 90%.

Scleral buckling surgery, on the other hand, has a high anatomical success rate and is still a feasible treatment option for rhegmatogenous retinal detachment associated with subretinal

proliferations with or without mild anterior proliferative vitreoretinopathy (PVR) with lower incidence of iatrogenic breaks and cataract development or progression.The most important complications are refractive change, intrusion or extrusion, infection, globe ischemia, and choroidal detachments, amongst others. Previous research has found that depending on the preoperative refractive status, surgical method, buckle height, and other factors can lead to refractive error changes after scleral buckling surgery. Nonetheless, after stabilizing refractive error in the eyes with buckle-induced refractive error, laser refractive surgery may be conducted safely [19].

A meta-analysis[20]compared PPV and SB and found thatSB had a significantly improved logMAR VA in the earlypostoperative period (i.e., <1 month), but not at any time point thereafter or at final follow-up.Another meta-analysis[21] found no difference between PPV and SB for the primary reattachment rate.

The Primary Retinal Detachment Outcomes Study group have reported the results of a recent multicentered retrospective cohort study comparing PPV + SB, PPV, and SB.[22,23]In the phakic subgroup, the anatomical success rate was significantly higher (91.7%) in scleral buckling group compared with vitrectomy (83.1%; P = 0.0041).[23]While in the pseudophakic subgroup, the reattachment rate was higher for the PPV+ SB (92%) group than the vitrectomy (84%; P = 0.009) alone group.

The goal of retinal detachment surgery should be to attain permanent retinal reattachment with a single surgical procedure with minimizing the need for a second procedure to deal with any surgical complication. Case selection is the key for the surgical intervention. Young and phakic patients have an excellent chance of successful outcome with scleral buckling alone while in pseudophakic eyes with proliferative vitreoretinopathy grade C, vitrectomy would offer higher reattachment rates. In extensive retinal detachment with a complex vitreous anatomy, the combined approach increases the likelihood of single surgery success.

CONCLUSION:

In this study we concluded that most of the retinal surgeons preferscleral buckling as the procedure of choice for rhegmatogenous retinal detachmentthan vitrectomy as it gives a higher anatomical success rate with less pre- and post-operative complications.

REFERENCES:

1.Park SJ, Choi NK, Choi NK, Park KH, Woo SJ. Five year nationwide incidence of rhegmatogenous retinal detachment requiring surgery in Korea.PLoS One. 2013;8(11):e80174. [PMC free article] [PubMed] [Google Scholar]

2. Mitry D, Fleck BW, Wright AF, Campbell H, Charteris DG. Pathogenesis of rhegmatogenous retinal detachment: predisposing anatomy and cell biology. Retina. 2010;30(10):1561–1572. [PubMed] [Google Scholar]

3. Mitry D, Charteris DG, Fleck BW, Campbell H, Singh J. The epidemiology of rhegmatogenous retinal detachment: geographical variation and clinical associations. Br J Ophthalmol. 2010;94(6):678–684. [PubMed] [Google Scholar]

4. Machemer R, Buettner H, Norton EW, Parel JM. Vitrectomy: a pars plana approach. Trans Am AcadOphthalmolOtolaryngol. 1971;75(4):813–820. [PubMed] [Google Scholar]

5. Pak KY, Lee SJ, Kwon HJ, Park SW, Byon IS, Lee JE. Exclusive use of air as gas tamponade in rhegmatogenous retinal detachment. J Ophthalmol. 2017;2017:1341948. [PMC free article] [PubMed] [Google Scholar]

6. Park SW, Kwon HJ, Kim HY, Byon IS, Lee JE, Oum BS. Comparison of scleral buckling and vitrectomy using wide angle viewing system for rhegmatogenous retinal detachment in patients older than 35 years. BMC Ophthalmol. 2015;15:121. [PMC free article] [PubMed] [Google Scholar]

7. Wong CW, Wong WL, Yeo IY, et al. Trends and factors related to outcomes for primary rhegmatogenous retinal detachment surgery in a large Asian tertiary eye center. Retina. 2014;34(4):684–692. [PubMed] [Google Scholar]

8. Schneider EW, Geraets RL, Johnson MW. Pars plana vitrectomy without adjuvant procedures for repair of primary rhegmatogenous retinal detachment. Retina. 2012;32(2):213–219. [PubMed] [Google Scholar]

9. Schwartz SG, Flynn HW. Pars plana vitrectomy for primary rhegmatogenous retinal detachment. ClinOphthalmol. 2008;2(1):57–63. [PMC free article] [PubMed] [Google Scholar]

10. Feltgen N, Heimann H, Hoerauf H, Walter P, Hilgers RD, Heussen N, Writing Group For The SPR Study Investigators Scleral buckling versus primary vitrectomy in rhegmatogenous retinal detachment study (SPR study): risk assessment of anatomical outcome. SPR study report no. 7. ActaOphthalmol. 2013;91(3):282–287. [PubMed] [Google Scholar]

11.Heussen N, Feltgen N, Walter P, Hoerauf H, Hilgers RD, Heimann H, SPR Study Group Scleral buckling versus primary vitrectomy in rhegmatogenous retinal detachment study (SPR Study): predictive factors for functional outcome. Study report no. 6. Graefes Arch ClinExpOphthalmol. 2011;249(8):1129–1136. [PubMed] [Google Scholar]
12. Heussen N, Hilgers RD, Heimann H, Collins L, Grisanti S, SPR study group Scleral buckling versus primary vitrectomy in rhegmatogenous retinal detachment study (SPR study): multiple-event analysis of risk factors for reoperations. SPR Study report no. 4. ActaOphthalmol. 2011;89(7):622–628. [PubMed] [Google Scholar]
13. Feltgen N, Weiss C, Wolf S, Ottenberg D, Heimann H, SPR Study Group Scleral buckling versus primary vitrectomy in rhegmatogenous retinal detachment study (SPR Study): recruitment list evaluation. Study report no. 2. Graefes Arch ClinExpOphthalmol. 2007;245(6):803–809. [PubMed] [Google Scholar]
14. Heimann H, Hellmich M, Bornfeld N, Bartz-Schmidt KU, Hilgers RD, Foerster MH. Scleral buckling versus primary vitrectomy in rhegmatogenous retinal detachment (SPR Study): design issues and implications. SPR Study report no. 1. Graefes Arch ClinExpOphthalmol. 2001;239(8):567–574. [PubMed] [Google Scholar]
15.Heimann H, Bartz-Schmidt KU, Bornfeld N, Weiss C, Hilgers RD, Foerster MH, Scleral Buckling versus Primary Vitrectomy in Rhegmatogenous Retinal Detachment Study Group Scleral buckling versus primary vitrectomy in rhegmatogenous retinal detachment: a prospective randomized multicenter clinical study. Ophthalmology. 2007;114(12):2142–2154. [PubMed] [Google Scholar]
16.Brazitikos PD, Adroudi S, Christen WG, Stangos NTR. Primary pars plana vitrectomy versus scleral buckle surgery for the treatment of pseudophakic retinal detachment: a randomized clinical trial. Retina. 2005;25:957–64.
17.Wallyn RH, Hilton GF. Subretinal fibrosis in retinal detachment. Arch Ophthalmol 1979; 97(11): 2128–2129. [PubMed] [Google Scholar]
18.Yao Y, Jiang L, Wang Z, Zhang M. Scleral Buckling Procedures for Longstanding or Chronic Rhegmatogenous Retinal Detachment with Subretinal Proliferation. Ophthalmology 2006; 113: 821–825. [PubMed] [Google Scholar]

19.Holopainen JM, Vuori E, Moilanen JA, Zalentein WN. TervoTM.Excimer laser refractive correction of myopia after episcleral buckling for rhegmatogenous retinal detachment. J Cataract Refract Surg 2007; 33(10): 1744–1749. [PubMed] [Google Scholar]
20. Popovic MM, Muni RH, Nichani P, Kertes PJ. Pars plana vitrectomy, scleral buckle, and pneumatic retinopexy for the management of rhegmatogenous retinal detachment: a meta-analysis. Survey of Ophthalmology. 2022 Jan 1;67(1):184-96.
21. Znaor L, Medic A, Binder S, et al. Pars plana vitrectomy versus scleral buckling for repairing simple rhegmatogenous retinal detachments. Cochrane Database Syst Rev. 2019;3:CD009562.
22. Joseph DP, Ryan EH, Ryan CM, Forbes NJK, Wagley S, Yonekawa Y, et al. Primary retinal detachment outcomes study: pseudophakic retinal detachment outcomes. Primary retinal detachment outcomes study report number 3. Ophthalmology. 2020;127:1507–14.
23. Ryan EH, Ryan CM, Forbes NJ, Yonekawa Y, Wagley S, Mittra RA, et al. Primary retinal detachment outcomes study report number 2: phakic retinal detachment outcomes. Ophthalmology. 2020;127:1077–85.