Original Paper

OUTCOME OF SCLERAL BUCKLING SURGERY IN RHEGMATOGENOUS RETINAL DETACHMENT

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Abstract

A longitudinal study was carried out in the vitreo-retina clinic of the National Institute of Ophthalmology and Hospital (NIO&H) on 30 eyes of 25 patients who were treated with scleral buckle (SB) surgery during the period of October 2004 to September 2005 of either sex. The aim of this study was to determine the outcome of SB surgery in Rhegmatogenous retinal detachment (RRD). The main entry criteria for this study were primary RRD treated with SB and for which 12 weeks of follow-up were available. The eyes with proliferative vitreoretinopathy or with history of SB surgery, vitrectomy, posterior segment open-globe trauma or significant concurrent eye disease e.g. amblyopia, macular disease etc were excluded from this study. Overall twenty-four eyes (80%) achieved retinal reattachment with one SB procedure (encircling or segmental); the median 12-week visual acuity was 6/12. Three additional eyes (10%) achieved retinal reattachment with one vitreoretinal procedure; the median 12-week visual acuity was 6/9. Three eyes (10%) never achieved retinal reattachment despite one additional vitreoretinal procedure, and 12-week visual acuity was no perception of light. It can be concluded that SB for primary RRD achieves anatomical efficacy and preservation of central vision in the majority of eyes.

Key words: Scleral buckle, Rhegmatogenous retinal detachment outcome.

Introduction

Placement of a scleral buckle (SB) is the most established technique for the treatment of primary Rhegmatogenous retinal detachment (RRD). Although Gonin developed the principles of retinal reattachment in the early 20th century, modern scleral buckling procedures date to the 1950s and the work of Custodis, Schepens et al and Arruga[1].

There is currently a wealth of information supporting the short-term efficacy of this procedure, but there is a relative paucity of long-term data. In a review of 7 articles reporting of 4940 eyes, Wilkinson and Rice[2] reported a 75% to 91% success rate with a single procedure and an 88% to 97% success rate with multiple procedures. Wilkinson and Rice also reported that 39% to 56% of successfully treated eyes attained a visual acuity of 20/50 or better, although this percentage decreased to between 37% to 42%, when only macula-off RRDs were considered. Stephen G. Schwartz et al[3] reported 20 years follow-up data for patients receiving a SB for treatment of primary RRD. It was a case-control study. They identified 227 eyes with primary RRD who were treated with a SB, and for whom at least 20 years of follow-up data were available. Results were classified into 3 subgroups: retina reattached with one procedure, retina reattached with one or more additional vitreoretinal procedures; or retina detached at 20 years. It was found that 186 eyes (82%) achieved retinal reattachment with one SB procedure and with a median final visual acuity of 20/40 at 20 years of follow-up. An additional 30 eyes (13%) achieved retinal reattachment after one or more additional vitreoretinal procedures, with a median final visual acuity of 20/50. Eleven eyes (5%) were detached at the 20 years follow-up examination, With a final visual acuity in all eyes of no perception of light.

Slceral buckling for primary RRD achieves anatomical efficacy and preservation of central vision in the majority of eyes at 20 years' follow-up. The one-procedure success rate was 82%, overall success rate was 95%, and median final visual acuity was 20/40.

Materials and Methods

A longitudinal study was done at the vitreo-retina clinic of the National Institute of Ophthalmology and Hospital (NIO&H) on 30 eyes of 25 patients who were treated with SB surgery during the period of October 2004 to September 2005. Patients were of either sex. The age ranged from 30 to 70 years. The main entry criterion for this study was primary RRD treated with a SB and for which 12 weeks of follow-up were available. The diagnosis of primary RRD was made from the symptoms presented by the patients and signs found during clinical examination.

All patients present photopsia and floaters for the

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considerable period of time. The signs of Marcus Gunn pupil, lower intra ocular pressure (IOP), mild anterior chamber reaction, tobacco dust in the anterior vitreous and elevation of peripheral retina along with blood vessels by indirect ophthalmoscope were diagnostic. The primary retinal break was found out by analyzing quadrantic distribution of breaks, configuration of SRF and history of visual field defect. It has become convenient to find out the break by using indirect ophthalmoscopy with scleral indentation and biomicroscopic indirect ophthalmoscopy. Eyes with proliferative vitreoretinopathy or with history of SB, vitrectomy, posterior segment open-globe trauma or significant concurrent eye diseases such as amblyopia, macular disease, etc were excluded from the study. The eyes were subdivided into four groups: phakic macula-on RRDs, phakic macula-off RRDs, aphakic/pseudophakic macula-on RRDs and aphakic/pseudophakic macula-off RRDs. The "macula-off" groups included those eyes in which the fovea was involved in the RRD. All macula-off RRDs were treated with encircling procedures. Some macula-on RRDs were treated with segmental procedures and these data were independently recorded and analyzed. Each eye was classified into 1 of 3 subgroups; retina reattached with 1 SB procedure ("primary" success); retina eventually reattached with additional vitreoretinal procedures ("eventual" success) or retina detached at the 12 weeks follow-up ("failure"). For the purpose of this study, "additional vitreoretinal procedure" was defined as those procedures that were necessary to achieve or maintain retinal reattachment. These included repositioning the existing buckle or adding new ones (to treat a recurrent or persistent detachment), pars plana vitrectomy, drainage of SRF and /or injecting endotamponade (air or gas).

The pre-operative ophthalmic evaluation included a history, complete ocular examination, fundus drawing and post-operative evaluation included assessing visual acuity, indirect ophthalmoscopy, Goldmann triple-mirror examinaton and Goldmann applanation tonometry. The outcome was analyzed at the end of 12 weeks. For the purpose of this study, "out come" was defined as preservation of vision, anatomical attachment of retina, preservation of the shape of the eye ball and prevention of complication of retinal detachment following surgery.

Results

Out of 25 patients included in the study, 14 were male and 11 were female. The age varies from 30 to 70 years,

Table-I: Location of retinal break (n=30).

Location	Number	percentage
Suprotemporal	15	50
Inferotemporal	06	20
Superonasal	06	20
Inferonasal	03	10

more than 50% of which were above 50 years of age. Half of the 30 eyes were superotemporal breaks (table-I). It was largely (46%) inferior bullous (table- II).

Table -II: Configuration of RRD (n=30).

Configuration	Number	Percentage
Bullous inferior RD	14	46
Subtotal RD	08	26
Inferior RD with equal fluid level	04	13
Inferior RD with unequal fluid level	04	13

The lattice degeneration was the commonest (50%) predisposing factor (table-III). A total of 30 eyes received treatment for a primary RRD. Of these, 27 eyes (90%) were initially treated with encircling elements (a silicone rod or band). The median pre-operative visual acuity was 3/60 (range 6/60 to light perception).

Table -III: Presence of predisposing factors (n=30).

Predisposing factor	Number	Percentage
Lattice degeneration	15	50
Detachment in the fellow eye	05	16
Trauma	10	33

Twenty two eyes (73%) achieved retinal reattachment with one encircling procedure; the median 12 week visual acuity was 6/12. Three additional eyes (10%) achieved retinal reattachment after one additional vitreoretinal procedure; the median 12-week visual acuity was 6/9. Two eyes (7%) never achieved retinal reattachment despite one additional vitreoretinal procedure and 12-week visual acuity was no perception of light. Three eyes (10%) were initially treated with segmental elements. Of these, the median pre-operative visual acuity was 6/18 (range, 6/12 to counting fingers). Two of these eyes (66%) achieved retinal reattachment with one segmental procedure; the median 12-week visual acuity was 6/9. One eye (33%) never achieved retinal reattachment despite one additional vitreoretinal procedure, with a final visual acuity of no perception of light. Overall, twenty four eyes (80%) achieved retinal reattachment with one SB procedure (encircling or segmental); the median 12-week visual acuity was 6/12. Three additional eyes (10%) achieved retinal reattachment with one vitreoretinal procedure; the median 12-week visual acuity was 6/9. Three eyes (10%) never achieved retinal reattachment despite one additional vitreoretinal procedure, and 12-week visual acuity was no perception of light. A total of 27 eyes (90%) received one or more supplemental treatment following the initial scleral buckle, with the most frequently employed modalities being adjunctive photocoagulation in 6 eyes (22%) and cryotherapy in 2 eyes (7%). Additional procedures included loosening of buckle element in one eye (4%). Of the 2 eyes that

underwent loosening, showed ophthalmoscopic evidence of trans-scleral (internal) erosion at the time of loosening. Median visual acuity at 12 weeks' follow-up was 6/9 in the eyes that underwent loosening for erosion. No eyes developed a recurrent retinal detachment, vitreous haemorrhage or endophthalmitis. Four eyes developed raised IOP at 1st week, which was managed by oral acetazolamide. One eye developed acute orbital cellulitis which was managed by removal of the buckling elements and topical and systemic antibiotic. Four patients developed refractive error and were corrected by spectacle and four patients developed cataract. They were scheduled for cataract extraction.

Table-IV : Summarized data for all groups of patients.

Group	Primary	Eventual	Failure
Total			
Encircling (n=27)	22 (81) 6/12	3(11) 6/9	2 (07)
Segmental (n=03)	02 (66) 6/9	0	1 (33)
Total (n= 30)	24 (80) 6/12	3(10) 6/9	3 (10)
Phakic macula-on			
Encircling (n=8)	7(87) 6/9	1(12.5) 6/9	0
Segmental (n=3)	2(66) 6/9	0	1(33)
Total (n=11)	9(82) 6/9	1(9) 6/9	1(9)
Phakic macula-off			
Encircling (n=11)	8(72) 6/18	1 (9) 6/18	2 (18)
Aphakic macula-on			
Encircling (n=3)	3(100) 6/9	0	0
Segmental (n=0)	0	0	0
Total (n= 3)	3(100) 6/9	0	0
Aphakic macula-off			
Encircling (n=5)	4(80) 6/9	1(20) 6/12	0

☆ Data are presented as number of eyes (percentage), visual acuity

Discussion

This is a longitudinal study on 30 eyes of 25 patients with primary RRD that was without evidence of pre-existing advanced proliferative vitreoretinopathy, treated with scleral buckling, and with 12 weeks of follow-up data. Because of this specialized nature of this series, direct comparison with other reports is not possible, but certain comparison may be made. The aforementioned rates of retinal reattachment are consistent with previously published studies. Wilkinson and Rice[2] found that, in the short-term, 75% to 91% of eyes were reattached with one procedure, and 88% to 97% were reattached with one or more re-operations. We report that, at 12 weeks' follow-up 80% of eyes were reattached after one procedure and 90% were reattached after multiple procedures. This report is also very close to Schwartz et al[3] study on twenty years follow-up for scleral buckling. They reported, 82% of eyes were reattached after one procedure and 95% were reattached after multiple procedures. None in this series developed recurrent retinal detachment during follow-up time. The implication is that a successful SB procedure tends to remain stable. This finding is consistent with previously reported data. Regarding visual function, Wilkinson and Rice[2] reported that 39% to 56% of eyes achieved a visual acuity of 6/12 or better in the short-term. Kreissig et al[4] reported a mean visual acuity of 6/12 at 15 years' follow-up in successfully treated eyes. Tornquist and Tornquist[5] found that only 34% of successful cases had visual acuity better than 6/12 at 10 years' follow-up. Visual acuity of out series is very close to Stephen G. Schwartz et al[3], who found that 82% of successful cases had visual acuity better than 6/12 at 20 years' follow-up. The conclusion, therefore, is that a SB offers long-term stabilization or improvement of central vision in the majority of eyes with primary RRD. Reduced vision after successful re-attachment of the retina may be due to morphologic abnormalities at the macula. In this study, all macula-off RRDs were treated with an encircling element. While the majority of eyes with macula-on RRDs also received an encircling element, the percentage of primary successes in phakic macula-on RRDs was 80% in both groups, and median 12-week post-operative visual acuity was likewise equal at 6/9 in both groups. We therefore, agree with the work of kreissig et al[4], that in carefully selected patients, segmental buckling procedures seem to be as efficacious as encircling procedures. We believe that our report provides support that the encircling technique can offer both anatomical and visual stability for the majority of eyes.

The weakness of this study was its very short follow-up time. Therefore, the long-term visual and anatomical stability of these patients are not representative. One advantage of this short-term follow-up is that less chance of drop-out from the study. Therefore, these data may represent a 'best case' scenario. A good number of eyes received post-operative adjunctive photocoagulation (22%) and cryotherapy (7%) during first three months following the initial surgery. The treatment was applied to reinforce the original chorioretinal adhesion, rather than in response to new post-operative retinal breaks or detachments. It is therefore, not known what the effect would have been had this supplemental treatment not been administered. Kreissig et al[4] subdivided re-detachment into early (occurring 2-4 months after surgery) and late (occurring 3-7 years after surgery). They found that early re-detachments were due to proliferative vitreoretinopathy, and that late re-detachments were due to formation of new retinal breaks. It is possible that post-operative supplemental retinopathy may have decreased the rate of re-detachment. A related point is that two eyes underwent

loosening of the SB was at least partly due to the fact that silicone rods predispose to high rate of trans-scleral (internal) erosion.

Conclusion

Scleral buckling for primary RRD achieves anatomical efficacy and preservation of central vision in the majority of eyes. A good percentage of RRDs need additional vitreoretinal procedure, therefore, methods for the repair frequently used in combination[6]. The need for multiple techniques is in part due to the fact that none of the methods directly repairs a retinal defect. No two retinal detachments are the same and care must be taken to tailor the surgical approach to the altered anatomy and to the specific forces acting on the retina in the individual case.

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