

BARRIER LASER PHOTOCOAGULATION FOR RECURRENT RETINAL DETACHMENT

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ABSTRACT

Objective: To describe results of barrier laser photocoagulation in preventing progression of recurrent retinal detachment.

Methodology: Prospective review of five patients with recurrent retinal detachment confined to the peripheral inferior retina. Three rows of barrier argon laser photocoagulation of moderate intensity white burns were performed. Patients were observed carefully after laser photocoagulation for signs of progression of retinal detachment beyond the barrier laser confines.

Results: Barrier laser photocoagulation was successful in limiting the progression of retinal detachment in all cases during follow-up period (average 34.4 months), and maintaining good central visual acuity.

Conclusion: Barrier laser photocoagulation can be useful in preventing progression of recurrent retinal detachment in selected patients.

KEY WORDS: Recurrent retinal detachment, Proliferative vitreoretinopathy (PVR), Laser photocoagulation, Barrier laser photocoagulation, Demarcation laser photocoagulation.

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INTRODUCTION

With improvements in surgical techniques, more than 80% of cases of retinal detachment achieve successful retinal re-attachment after one procedure.¹ The retina may fail to reattach at the time of surgery (primary failure) or early recurrent retinal detachment after initial success may occur (secondary failure) within 6-8 weeks of primary surgery.²

The current management of patients with secondary failure, which frequently affects inferior peripheral retina, involves further surgical intervention such as scleral buckling, Pars plana vitrectomy (PPV), membrane peel, laser photocoagulation and long acting tamponade.^{3,4} However, such surgical procedures may be associated with significant risks and complications. The aim of this case series is to report our experience with 'barrier' or demarcation laser to confine the secondary recurrent retinal detachment to the peripheral retina, thus maintaining good visual acuity without need for repeat invasive procedure.

PATIENTS AND METHODS

Five consecutive patients who developed recurrent retinal detachment were prospectively considered candidates for barrier laser photocoagulation if recurrent retinal detachment due to proliferative vitreoretinopathy (PVR) was macula sparing and confined to the peripheral retina.- Three rows of barrier argon

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laser photocoagulation, of moderate intensity white burns, were performed using Laser indirect ophthalmoscope (LIO) or wide angle contact lens with slit lamp. The barrier laser photocoagulation was initiated in the attached retina just outside area of retinal detachment and extended over the scleral buckle up to ora serrata in the affected segment of retinal detachment. Patients were observed carefully after laser photocoagulation for signs of progression of retinal detachment beyond the barrier laser confines.

Barrier laser photocoagulation was successful in limiting the progression of retinal detachment in all five cases. The patient details and characteristics (Table-I) are as follows:

Case 1: A 70 Years old man presented with recent deterioration of visual acuity in his right eye in August 2001. His past ophthalmic history was significant that he was under close observation at another hospital for a longstanding shallow inferior retinal detachment since 1998, and no surgery was recommended due to non progressive nature of retinal detachment. On examination his visual acuity was 6/9 in the affected right eye. A macula sparing retinal detachment involving

inferior and superotemporal aspect of retina was present with multiple retinal breaks. It was apparent that his symptoms were related to recent increase in SRF and progression of RRD. A procedure of Cryotherapy, scleral buckle (360 SB, size 42, 3.5mm) and drainage of SRF was undertaken. He was noted to have choroidal effusion in the immediate post-operative period which resolved in two weeks, and the retina was anatomically attached at six weeks with visual acuity of 6/9. However, a shallow elevation of retina inferiorly was noted at his follow-up visit at three months. The procedure of barrier laser with three rows of burns (# 450, Power 350mw, Time 0.15s) in the attached retina up to the ora serrata was performed using LIO. A good laser reaction was noted in the post operative period. The retina has remained stable with no extension of SRF in the follow-up period of over three years, and patient maintains a visual acuity of 6/9.

Case 2: A 64 years old Insulin dependent diabetic and hypertensive male, who was pseudophakic presented with 10 day history of visual field defect and reduction of visual acuity in his left eye in December 2004. Ocular assessment showed a visual acuity of Hand motion (HM), and a large superior bullous retinal detachment corresponding to a large retinal tear. A procedure of PPV, 360 SB, Internal

Table-I: Summary of patient characteristics, pre-op, post-op and final outcomes.

Case 1:	
Fig A: Male, 70 Years old. Longstanding RD, VA: 6/9. Multiple breaks in retina.	
Fig B: Surgical Procedure. 360 scleral buckle, cryotherapy, drainage of subretinal fluid. Post operatively retina flat and visual acuity 6/9.	
Fig C: Recurrent retinal detachment involving inferior retina at 3 months post-op. Barrier laser undertaken. Retina stable with attached macula at follow-up of 4 years. VA: 6/9	

Case 2:	
Fig A: Male, 64 Years old, Pseudophakic. Large bullous RD, One large flap tears in superior retina. VA: HM	
Fig B: Surgical Procedure: PPV, 360 scleral buckle, laserpexy and 12% C3F8. Retina in post-op period flat. VA: 6/24	
Fig C: Recurrent retinal detachment involving inferior retina at 2 months post-op. Barrier laser undertaken. Retina stable with attached macula at last follow-up	

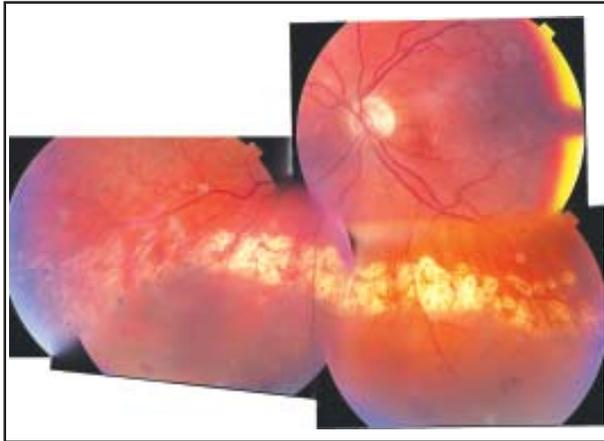


Fig-1: Composite colour photograph of case-2, showing laser reaction below the inferior vascular arcade, with attached macula beyond confines of barrier laser.

drainage of SRF, laser photocoagulation and 12% C3F8 gas tamponade was performed under local anaesthetic His retina was attached with visual acuity of 6/24 at two months post-operatively. However, a shallow peripheral inferior retinal detachment was noted at his three month post-op visit.

A procedure of barrier laser using Quadraspheric (VOLK) lens with slit lamp was performed (#950, time 0.15s, spot size 400u, power 350mw). A good barrier laser reaction around the detached retina was noted (Fig-2) and the retina has remained stable with visual acuity of 6/18 at his last follow-up visit.

Case 3:

Fig A:

Male, 59 Years old, Myope. Retinal detachment with two flap tears in superior retina. VA: 6/24



Fig B:

Surgical Procedure: PPV, 360 scleral buckle, laserpexy, 12% C3F8. Retina attached in post-op period. VA: 6/18



Fig: C

Recurrent retinal detachment at 6 weeks post-op. Barrier laser in inferior retina undertaken. Retina stable with attached macula at last follow-up. VA:6/12



Case 3: A 59 years old healthy, myope presented with history of visual field defect and deterioration of vision in right eye of one week duration in February 2005. Ocular assessment showed a visual acuity of 6/24, and a bullous retinal detachment involving superior and nasal aspect of retina. Two large flap tears were present in the corresponding retina. A procedure of PPV, 360 SB, internal drainage of SRF, laser photocoagulation and 12% c3F8 gas tamponade was performed. His retina was attached in the immediate post-operative period with acuity of 6/18 until six weeks, when a shallow inferior retinal detachment with early PVR was noted. The procedure of barrier laser photocoagulation in the inferior affected retina was performed using quadraspheric lens (# 1420, Time 0.15s, Power 220 mw, Spot size 300u). The retinal detachment has not progressed during his follow up and he retains a visual acuity of 6/12.

Case 4: An 81 years old male with medically controlled glaucoma, who was pseudophakic presented with one day history of visual field defect and reduction of visual acuity in his right eye in May 2004. Ocular assessment showed a visual acuity of 6/60, and a large superior bullous retinal detachment involving the macula and a retinal tear was noted. A procedure of PPV, 360 SB, Internal drainage of SRF,

Case 4:

Fig A:

Male, 81 years old, Pseudophakic, Glaucoma. Retinal detachment. Large bullous retinal detachment with flap tear in superior retina. VA: 6/60



Fig B:

Surgical Procedure: PPV, 360 scleral buckle, cryotherapy, laserpexy, 12% C3F8 gas. Retina attached in post-op period. VA: 6/36



Fig C:

Recurrent inferior retinal detachment. Barrier laser performed. Retina stable with attached macula at 8 months post-op. VA: 6/9



cryopexy, laser photocoagulation and 12% C3F8 gas tamponade was performed under local anaesthetic His retina was attached with visual acuity of 6/36 at 2 months post-operatively. However, a shallow peripheral inferior retinal detachment was noted five month post-operatively.

A procedure of demarcation laser using Quadraspheric (VOLK) lens with slit lamp was performed (#650, time 0.15s, spot size 400u, power 400mw). A good barrier laser reaction around the detached retina was noted and the retina has remained stable with visual acuity of 6/9 at his last follow-up visit.

Case 5: An eighty two years old healthy male underwent phacoemulsification surgery for nuclear sclerotic cataract in February 2006. However, the surgery was complicated by posterior capsular rupture and dislocation of nuclear fragments into the vitreous cavity. An infero-nasal retinal tear and localised retinal detachment was noticed on post-operative examination.

A procedure of PPV to remove dislocated nuclear fragments, 360° SB, cryotherapy and 20% SF6 gas tamonade was undertaken under local anesthetic. The patient developed 360° choroidal effusion in the early post-operative period, which resolved over a period of two

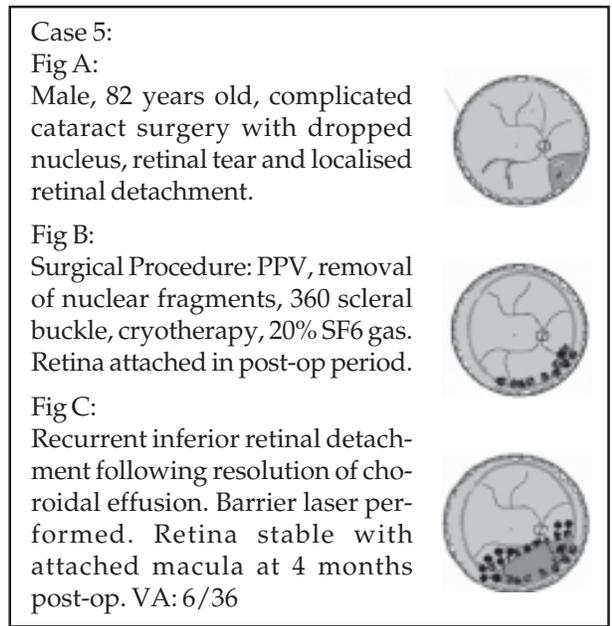
weeks. The retina was flat for 5 weeks, when a shallow elevation of inferior retina was noticed. A procedure of demarcation laser was carried out (# 1200, Power 350 MW, spot size 200u, time 0.1s), the retina has remained stable with no extension of retinal detachment into the macular area and the maintain a corrected vision of 6/36.

DISCUSSION

Recurrent retinal detachment is an important complication of retinal reattachment surgery. Proliferative vitreoretinopathy (PVR) is usual cause of failure in the early post-operative period.⁵ Other causes such as inadequate chorioretinal adhesions, persistent vitreoretinal traction, failure of adequate closure of retinal breaks and formation of new retinal breaks may also be responsible for recurrent retinal detachment.

Various surgical options are available to treat such secondary retinal detachment surgery failures. The revision of scleral buckle⁶ can be carried out in cases without significant PVR, where placement of buckle is adjusted to close retinal breaks. However, PPV is required in most cases to achieve relief of vitreoretinal traction and membranes.⁷ This is usually combined with drainage of sub retinal fluid as fluid-gas exchange is performed through the existing breaks or posterior retinotomy. Retinal tamponade in such cases is achieved with gas or silicone oil. Unfortunately, repeat surgery is associated with significant ocular complications such as cataract, glaucoma, retro-silicone membrane formation, emulsification and keratopathy.⁸ Other alternatives which can be considered only for localised superior retinal detachments include gas injection⁹ and pneumatic retinopexy.¹⁰

This case series describes successful use of barrier laser photocoagulation in selected patients with early PVR associated recurrent retinal detachments confined to the periphery. Steel et al¹¹ have described a similar technique of laser photocoagulation in the presence of silicone oil to confine and stabilise recurrent PVR related peripheral retinal detachments enabling



the timely removal of the oil. Barrier or demarcation laser photocoagulation has also been used as an alternative to surgery in patients with CMV retinitis associated retinal detachments¹² in HIV patients.

This case series is small and follow-up is limited. However, the final visual and anatomical outcome is very favourable with all patients developing no progression of retinal detachment and retaining visual acuity better than 6/36. Our patients were treated early before advanced PVR could involve the macular area, which is an important consideration for patients which may benefit from this technique. We believe that this lesser invasive technique of barrier laser photocoagulation can be useful in selected patients before more extensive procedures can be considered.

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