A Multivariate Analysis of Anatomic Success of Recurrent Retinal Detachment Treated with Pneumatic Retinopexy

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Purpose: The purpose of the study is to determine the success rate of pneumatic retinopexy (PR) after failed scleral buckling and to elucidate the predictors for anatomic failure by multiple logistic regression analysis.

Methods: Thirty-six eyes with recurrent retinal detachment after failed scleral buckling underwent PR. Intraocular tamponade was attained with SF_6 (20 eyes), C_3F_8 (13 eyes), and air (3 eyes). Median follow-up was 14 months.

Results: Retinal reattachment was obtained in 69.4%. Multivariate analysis identified two risk factors for failure: location of retinal break either on the posterior slope or posterior to buckle ($P = 0.01$) and extent of retinal detachment greater than two quadrants ($P = 0.02$).

Conclusions: Pneumatic retinopexy is an effective alternative to revision surgical operations if the leaking retinal break is located on the buckle.

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Pneumatic retinopexy has been widely accepted as an alternative treatment to traditional scleral buckling for selected primary rhegmatogenous retinal detachment.[1–7] However, the role of pneumatic retinopexy to treat recurrent retinal detachment after failed scleral buckling has not yet been well defined.[8–10] The purpose of this retrospective study is to report the success rate after pneumatic retinopexy for recurrent retinal detachment and to determine the predictors for failure by multiple logistic regression analysis.

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Materials and Methods

From August 1988 to December 1995, 36 consecutive eyes with recurrent retinal detachments after failed scleral buckling underwent pneumatic retinopexy. Of these 36 eyes, 12 had previous buckling done at our institute and 24 were referred as recurrent retinal detachment after buckling for further management. The selection criteria for pneumatic retinopexy included failed primary scleral buckling procedure, a more-than-7-day duration of recurrent retinal detachment, presence of leaking retinal breaks in the superior 8 clock hours, absence of proliferative vitreoretinopathy, absence of glaucoma, and patient willingness to maintain the postoperative positioning. Patients in whom recurrence of retinal detachment developed after vitrectomy were excluded.

The operative technique consisted of intravitreous gas or air injection as described by Hilton and Grizzard.[1] The chorioretinal adhesions were created with intraoperative cryopexy if the retinal break was located anterior to encircling band (#240 band), and with postoperative laser if

Table 1. Detachment Characteristics

Characteristic	No. (%) of Eyes
Extent of RD	
<1 quadrant	11 (30.6)
1–2 quadrants	4 (11.1)
2–3 quadrants	12 (33.3)
4 quadrants	9 (25)
Macular involvement	22 (61.1)
Type of retinal break	
Atrophic	15 (41.7)
Tractional	17 (47.2)
Both atrophic and tractional	1 (28)
Retinal dialysis	3 (8.3)
Size of retinal break (in disc diameter)	
<1/2	22 (61.1)
1/2–1	10 (27.8)
>1	4 (11.1)
No. of retinal breaks	
1	27 (75)
2	6 (16.7)
3	2 (5.6)
>3	1 (2.8)
Relation of retinal break to buckle	
On the buckle	25 (69.4)
On the posterior slope of buckle	6 (16.7)
Posterior to buckle	5 (13.9)

RD = retinal detachment.

the retinal break was located on the buckle or posterior to the buckle. Preoperative variables studied included age, gender, right or left eye, Snellen's visual acuity, myopia, presence or absence of lens, interval between the buckling procedure and the recurrence, cause of recurrent retinal detachment (atrophic or traction retinal break), relation of retinal break to buckle, size of retinal break, number of retinal breaks, extent of retinal detachment, macular involvement, and its duration. Intraoperative data noted were type of gas or air injected, quantity used, paracentesis, and retinopexy. Postoperative variables recorded were reinjection of gas, reretinopexy, anatomic reattachment, management for recurrence, visual acuity, and follow-up.

The data were analyzed with descriptive statistics: chi-square and Fisher's exact test for categoric variables, Student's *t* test for continuous variables, and Mantel–Haenszel test for linear trend in proportion. A multivariate logistic regression analysis was done to identify independent predictors associated with anatomic failure. The follow-up ranged from 1 month to 8 years, mean of 23.4, and median of 14 months. The follow-up was more than 6 months for 24 eyes.

Results

The mean age of 36 patients was 38.6 years (range, 8–70 years). Thirty-one were males and 5 were females. The right eye was involved in 22 and the left eye in 14 patients. Preoperative myopia was present in 15 eyes, of which 8 had less than 5.0 diopters, 5 had between 5 and 10 diopters, and 2 had more than 10 diopters. The interval between the previous scleral buckling and pneumatic retinopexy was 7 days in 1 patient, 15 to 60 days in 5 patients, 61 to 120 days in 7 patients, 121 to 240 days in 10 patients, and more than 240 days in 13 patients. Two of 12 patients who underwent scleral buckling at our institute received intravitreous injection of air (2 eyes) and sulfur hexafluoride (1 eye) during buckling procedure. Preoperative visual acuity was 20/20 to 20/40 in 5 eyes, 20/60 to 20/120 in 7 eyes, 10/120 to 1.5/200 in 10 eyes, and counting fingers at 1 foot or less to light perception in 14 eyes. The eyes were phakic in 20 patients and aphakic in 16 patients. There was no pseudophakia in the study. The retinal detachment characteristics are summarized in Table 1. The retinal detachment was present in more than 2 quadrants (58.3%) in 21 eyes. The macula was involved in 22 eyes. The duration of macular detachment, estimated by the patient's history and the available records, was less than 2 weeks in four patients, 2 to 4 weeks in two patients, 1 to 2 months in four patients, 2 to 4 months in three patients, and more than 4 months in nine patients. Sulfur hexafluoride (SF_6) was used in 20, perfluoropropane (C_3F_8) in 13, and air in 3 patients. The mean volume of SF_6, C_3F_8, and air used was 0.35 ml, 0.34 ml, and 0.71 ml, respectively. Paracentesis was done in 17 eyes, of which 7 eyes had SF_6, 7 eyes had C_3F_8, and 3 eyes had air injection. Retinopexy was performed with intraoperative cryopexy in 11, postoperative laser in 20, and both cryopexy and laser in 2 eyes. In three eyes, retina remained detached after the intravitreous injection of gas or air and, hence, laser could not be performed. Five eyes needed reinjection of gas, and six needed repeat retinopexy in the postoperative period.

Anatomic reattachment was attained in 25 eyes (69.4%). The causes of failure are enumerated in Table 2. In seven eyes, breaks remained open. The failure was noted within 1 week in three eyes, 1 to 4 weeks in three eyes, 6 to 8 weeks in four eyes, and in one eye, retina never reattached. No new retinal break developed after pneumatic retinopexy. Of 11 eyes with failure, 1 had revision scleral buckling and 7 had vitrectomy procedures. Reattachment was obtained in all patients who underwent reoperations. Three patients did not report for advised revision scleral buckling.

Univariate analysis identified the following risk factors for failure: location of retinal break either on the posterior slope or posterior to buckle ($P = 0.009$), retinal detachment more than two quadrants ($P = 0.04$), macular

Table 2. Causes of Failure of Pneumatic Retinopexy (n= 11)

Cause	No. (%) of Eyes
Break never closed	7 (63.6)
Macular hole	2 (18.2)
Proliferative vitreoretinopathy	1 (9.1)
Unknown	1 (9.1)