

# Surgical Outcomes of Vitrectomy for Primary Treatment of Rhegmatogenous Retinal Detachment in Patients with Atopic Dermatitis

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**Purpose:** To investigate the clinical results of vitrectomy alone as the primary treatment for rhegmatogenous retinal detachment (RD) in patients with atopic dermatitis (AD).

**Methods:** The medical records of patients with AD treated for rhegmatogenous retinal detachment (RD) were retrospectively reviewed. We investigated the characteristics of retinal breaks and detachments, applied surgical methods, and results.

**Results:** Twenty eyes of 14 patients with AD who presented with rhegmatogenous RD and treated by vitrectomy were included in this analysis. Sixteen eyes (80%) were treated with vitrectomy, either alone or in combination with cataract surgery, and the retina was successfully attached to 94% of the eyes. There were four cases in which vitrectomy was combined with encircling. Reoperation was needed in half of the eyes that received vitrectomy with encircling, which presented nearly total detachment, severe proliferative vitreoretinopathy, and pseudophakia.

**Conclusions:** Vitrectomy alone, in combination with cataract surgery, may be sufficient to treat rhegmatogenous RD in patients with AD. Additional encircling or buckling should still be considered in complicated cases.

**Key Words:** Atopic dermatitis, General surgery, Retinal detachment, Scleral buckling, Vitrectomy

Atopic dermatitis (AD) is a chronic, relapsing, pruritic, and inflammatory skin disease. The incidence of AD has increased in developed countries since the 1970s, with 10% to 20% of children and 1% to 7% of adults affected world-

wide [1–4]. AD is of significant concern to ophthalmologists because of its associated ophthalmic complications [5]. Common complications include external eye diseases, such as dry eye, keratoconjunctivitis, or blepharitis, but there are also complications that can severely affect vision, such as cataracts or retinal detachment (RD) [6]. The development of cataract and RD was 4.89 and 3.22 times more common in patients with AD than in the general population, respectively [6].

Although the etiology of RD in patients with AD has not been clearly elucidated, trauma is considered one of the most likely causes [7,8]. Patients with AD habitually rub or slap their eyes because of itching, which can lead to RD

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due to repetitive blunt trauma. This is supported by reports noting that RD in AD patients often shows fundus findings similar to those of traumatic RD [9], and that a decrease in RD was noted along with new dermatological therapies that more effectively control AD [10,11].

There have been few reports on the surgical methods and results of RD in patients with AD. Surgical treatment is required for rhegmatogenous RD, and scleral buckling has been the gold standard for treatment, especially in young patients with phakic eyes, while pars plana vitrectomy (PPV) is increasingly being replaced with technical developments. Although there are no additional guidelines for RD surgery in patients with AD, there is a tendency for more frequent use of PPV combined with encircling or segmental buckling to treat rhegmatogenous RD [12,13]. This study aimed to investigate the surgical outcomes of PPV for rhegmatogenous RD in patients with AD in recent years.

## Materials and Methods

This study was approved by the Institutional Review Board of Ajou University Hospital (No. AJIRB-MED-MDB-21-667) and complied with the Declaration of Helsinki. We retrospectively reviewed the medical records of AD patients who underwent PPV for RD at the Ophthalmology Department of Ajou University Hospital between January 2016 and December 2021. The requirement for informed consent was waived due to the retrospective nature of the study. The exclusion criteria were as follows: (1) patients with a history of previous retinal surgery (scleral buckling or PPV), (2) those who developed rhegmatogenous RD due to trauma, and (3) those who were followed up for less than 3 months after retinal surgery.

One of the two retinal specialists performed PPV for RD repair. PPV with or without cataract surgery was performed using the Constellation 25G System (Alcon Laboratories). Tamponade was performed with silicone oil (Oxane 5700, Bausch & Lomb Inc) or 10% to 12% C<sub>3</sub>F<sub>8</sub> gas (Teknomek) at the end of the PPV. The combined surgical method was determined by each surgeon according to age, lens status, location of retinal break, extent of detached retina, and presence of proliferative vitreoretinopathy (PVR). If the cataract grade was high enough to interfere with fundus visualization before and during PPV, cataract

removal and intraocular lens implantation were combined. Scleral buckling or encircling was performed using a silicone sponge or tire fixed with 5-0 Dacron sutures.

Demographic factors, such as age, sex, and ocular findings, including best-corrected visual acuity (BCVA) before and after surgery, were obtained from medical records. Successful primary RD repair was defined as reattachment of the retina maintained for more than 3 months after surgery. The presence of PVR was identified on the basis of the Retina Society classification. BCVA was measured using the Snellen visual acuity chart and converted to logarithm of the minimum angle of resolution (logMAR) for statistical analyses. Axial length was measured postoperatively in macula-off eyes with RD. Categorical variables are presented as numbers (percentages), whereas numeric variables are presented as mean  $\pm$  standard deviation. The paired *t*-test was used to analyze the change in BCVA following surgery, and values of *p* < 0.05 were considered statistically significant.

**Table 1.** Demographic of included patients with atopic dermatitis

Characteristic	Value
No. of patients	14
Age (yr)	27.1 $\pm$ 10.5
Male sex	12 (85.7)
Both eyes involved	6 (42.9)
No. of eyes	20
Pseudophakic eye	8 (40.0)
Macular-off retinal detachment	9 (45.0)
Preoperative proliferative vitreoretinopathy	6 (30.0)
Location of retinal break	
Superior	1 (5.0)
Temporal	9 (45.0)
Superotemporal	8 (40.0)
Nasal	1 (5.0)
Superonasal	1 (5.0)
Type of retinal break	
Retinal tear	15 (75.0)
Giant retinal tear	2 (10.0)
Retinal dialysis	2 (10.0)
Retinal hole	1 (5.0)

Values are presented as number only, mean  $\pm$  standard deviation, or number (%).

## Results

A total of 17 patients with AD who underwent RD surgery were identified, and one patient was excluded because no definite retinal break was found as the cause of RD. Two patients, both in their twenties, have received scleral bucking for primary RD repair due to clear crystalline lens and small single retinal break at far periphery. A total of 20 eyes with RD of 14 AD patients that received PPV were finally included for this analysis, including six patients with bilateral rhegmatogenous RD. The mean follow-up period was  $28.6 \pm 17.4$  months (range, 4–60 months).

Demographic and preoperative ocular characteristics are summarized in Table 1. Mean age was  $27.1 \pm 10.5$  years (range, 17–50 years), and there were 12 male (85.7%) and two female patients (14.3%). The mean axial length of the included eyes was  $25.8 \pm 1.6$  mm. Among the 20 eyes, eight (40%) were pseudophakic, and RD was noted within 2 months of cataract surgery in five eyes. Nearly half (45%) of the rhegmatogenous RD cases involved the macula, with  $5.9 \pm 2.9$  clock hours (range, 2–12 clock hours) as the mean extent of detachment. PVR was found in 30% (6 of 20 eyes), presenting grade C in all cases: three eyes with grade C posterior PVR and three eyes with grade C anterior

or PVR. Retinal breaks were found mainly at the temporal (nine eyes at temporal and eight eyes at superotemporal, 85%), with mean number of  $1.4 \pm 0.9$  (range, 1–4). Giant retinal tears were observed in 10% of patients.

PPV was performed in 20 eyes, and combined vitrectomy with cataract surgery was performed in eight eyes (Table 2). Scleral bucking or encircling was combined with PPV in four eyes; this was done to release vitreoretinal traction and to provide retinal support in cases with diffuse vitreoretinal pathological conditions such as giant tears and extensive peripheral degeneration, and in cases with PVR of grade C. Retinal reattachment was achieved with the initial surgery in 17 eyes (85%), especially in 15 of 16 eyes (93.8%) that underwent PPV with or without cataract surgery. BCVA (logMAR) was significantly improved at final examination, changing from  $0.89 \pm 0.72$  to  $0.23 \pm 0.46$  ( $p = 0.001$ ).

Oral corticosteroids were prescribed postoperatively in most cases (95%), with patient case already taking oral prednisolone for AD treatment. Prednisolone starting from 20 to 30 mg or triamcinolone from 16 to 24 mg and then tapered was usually prescribed for 1 to 8 weeks. Cyclosporine and/or antihistamine agents were used in 60% of patients whose information regarding AD medication was available.

**Table 2.** Surgical details in eyes with retinal detachment

Characteristic	Value (n = 20)
BCVA (logMAR)	
Preoperative	$0.89 \pm 0.72$
Postoperative (final)	$0.23 \pm 0.46$
Type of primary surgery	
PPV only	8 (40.0)
PPV with cataract surgery	8 (40.0)
PPV with encircling	4 (20.0)
Tamponade at initial PPV	
C <sub>3</sub> F <sub>8</sub> gas	16 (80.0)
Silicone oil	4 (20.0)
Success after initial RD repair	
All types of surgery	17 (85.0)
Among those with PPV with or without cataract surgery (n = 16)	15 (93.8)

Values are presented as mean  $\pm$  standard deviation or number (%). BCVA = best-corrected visual acuity; logMAR = logarithm of the minimum angle of resolution; PPV = pars plana vitrectomy; RD = retinal detachment.

### Complicated cases with reoperation

Three eyes required reoperation, including one bilateral case. The patient, a 28-year-old male, was referred to our department due to total RD with PVR in both eyes after cataract surgery for bilateral intumescent cataracts, and PPV with silicone oil tamponade and encircling using a 2.5-mm silicone tire was performed in both eyes (cases 1 and 2) (Table 3). The retina was attached to both eyes for 2 months, but inferior RD with new retinal tears at inferior periphery recurred in the left eye with silicone oil. In the right eye, a new RD occurred in the inferior quadrant when the silicone oil was exchanged with the C<sub>3</sub>F<sub>8</sub> gas, while previous RD lesion with giant retinal tears at the temporal periphery was still well attached. Reoperation with silicone oil reinjection (and retinectomy in the left eye) were performed in both eyes. Silicone oil removal, along with C<sub>3</sub>F<sub>8</sub> gas tamponade, was repeated in both eyes after 3 months, and there was no recurrent RD for 4 years of follow-up since the last operation.

**Table 3.** Ocular characteristics of eyes with retinal detachment in patients with atopic dermatitis

Case	Sex	Age (yr)	Site of eye	Retinal break	Location (no. of breaks)	Macula on/off	Extent of RD (clock hours)	Lens status	Primary surgery	Reoperation	PVR (grade)	BCVA (logMAR)	
												Preoperative	Final
1	Male	28	Right	Giant tear	Temporal (1)	Off	12	Pseudophakic	PPV + encircling	Yes	C	2.70	0.80
2	Male	28	Left	Giant tear	Nasal (3)	Off	12	Pseudophakic	PPV + encircling	Yes	C	1.90	0.64
3	Male	50	Right	Tear	Superior (1)	On	4	Phakic	PPV + cat op	No	No	0	0
4	Female	21	Left	Tear	Temporal (1)	On	4	Phakic	PPV + cat op	No	No	0.62	0
5	Female	21	Right	Tear	Temporal (3)	On	4	Phakic	PPV + cat op	No	No	0.40	0.02
6	Male	17	Left	Dialysis	Temporal (1)	On	3	Phakic	PPV + cat op	No	No	0.62	0
7	Male	17	Right	Tear	Temporal (1)	Off	7	Phakic	PPV + cat op	No	C	1.00	0.24
8	Male	23	Left	Tear	Temporal (1)	On	3	Phakic	PPV + cat op	No	No	0.90	0
9	Male	23	Right	Tear	Superotemporal (1)	On	4	Phakic	PPV	No	No	0	0
10	Male	18	Right	Tear	Superotemporal (1)	Off	8	Pseudophakic	PPV	No	No	1.00	0.10
11	Male	18	Left	Tear	Superotemporal (1)	On	5	Phakic	PPV	No	No	0.20	0.22
12	Male	33	Right	Hole	Superotemporal (1)	On	2	Phakic	PPV	No	No	1.90	0
13	Female	18	Right	Tear	Superotemporal (2)	Off	6	Phakic	PPV + cat op	No	No	1.90	0
14	Male	23	Right	Dialysis	Temporal (1)	Off	6	Pseudophakic	PPV + encircling	No	No	0.90	0
15	Male	23	Left	Tear	Superotemporal (1)	Off	11	Pseudophakic	PPV + encircling	No	C	0.50	0.22
16	Male	27	Left	Tear	Superotemporal (1)	On	6	Pseudophakic	PPV	Yes	C	0.68	1.90
17	Male	34	Right	Tear	Superotemporal (1)	On	4	Phakic	PPV	No	No	0	0
18	Male	19	Left	Tear	Temporal (1)	Off	7	Pseudophakic	PPV	No	C	1.00	0.02
19	Male	47	Left	Tear	Superonasal (1)	On	4	Pseudophakic	PPV	No	No	0.68	0
20	Male	22	Right	Tear	Temporal (1)	Off	5	Phakic	PPV + cat op	No	No	0.82	0.38

RD = retinal detachment; PVR = proliferative vitreoretinopathy; BCVA = best-corrected visual acuity; logMAR = logarithm of the minimum angle of resolution; PPV = pars plana vitrectomy; cat op = cataract operation.

Another patient was a 24-year-old male (case 16) (Table 3) who initially presented with an intumescent cataract in the left eye and suspected RD on ultrasonography. Cataract surgery was performed without intraoperative complications, and RD was identified postoperatively with a retinal tear located at the superotemporal periphery. PPV with silicone oil injection was performed, and the retina remained attached for 4 months after oil removal. However, the patient presented with total RD with PVR in the same eye, and silicone oil was reinjected. The retina was repeatedly detached when the silicone oil was removed, so that the silicone oil tamponade was maintained since the fourth operation. A retinal tear was recently noted in the other eye during a routine follow-up examination and was treated with barrier photocoagulation.

## Discussion

There is no significant difference between scleral buckling and PPV in the primary success rate, final visual acuity, and final anatomical success in the treatment of rhegmatogenous RD [14]. RD in patients with AD often involves both eyes and occurs in younger patients, compared to other RD patients without AD [10,13]. The rate of retinal reattachment after primary surgery in AD patients was 72% to 75% in studies before the 2000s, which was lower than the success rate of rhegmatogenous RD in patients without AD [15,16]. A case series with bilateral RD in AD patients revealed poor visual prognosis despite PPV combined with scleral buckling performed in most cases [12]. Accordingly, it is not easy to select an appropriate surgical method because of the relatively poor prognosis of RD in patients with AD.

It has been reported that causative breaks are often located at the periphery, especially in the temporal quadrant, and that retinal dialysis is relatively common in AD patients [13,17–19]. In this study, most peripheral retinal breaks were identified in the temporal quadrant, including retinal dialysis, which is similar to previous studies [17,18]. As peripherally located retinal breaks are easy to approach externally, scleral buckling or encircling might be primarily considered to treat RD in younger AD patients. Accordingly, scleral buckling or encircling, which are appropriate methods to treat RD with peripheral break in young patients with phakic eyes, has been frequently performed in

AD patients either combined with PPV or alone.

In this study, PPV either alone or in combination with cataract surgery was mainly applied as primary treatment as three-quarters of the included cases had already undergone or needed cataract surgery in this study. The surgical result of a 94% success rate in these cases suggests that PPV, either alone or combined with cataract surgery, might be sufficient to treat RD in patients with AD. Although this was a retrospective investigation with a small number of cases, the reattachment rate of PPV without additional scleral buckling in AD patients is not inferior to the surgical results in patients without AD [13,20]. On the other hand, PPV combined with encircling had been performed frequently in AD patients presenting large extent of detachment, concomitant PVR of grade C, and/or pseudophakia in this retrospective analysis. It should be noted that reoperation was needed in half of these eyes received PPV with encircling, with new retinal breaks. Moreover, eyes that required reoperation were all pseudophakic, which could mean that AD complications were severe enough to perform cataract surgery at a young age, and this might have been related to RD severity leading to severe tractional force in PVR and/or nearly total detachment. There is also another possibility that the existing tear might have been missed due to difficulty in observing the periphery in pseudophakic patients. Additional encircling or buckling might be helpful in these cases.

It is reported that the surgical results did not show differences between PPV with PPV combined with scleral buckling in noncomplex rhegmatogenous RD, which was probably related to the technological improvement of PPV [20]. Combined scleral buckling with PPV did not provide additional benefits in success rate or visual acuity even in patients with pseudophakia and inferior or multiple breaks [20,21]. The surgical trend for rhegmatogenous RD is significantly shifting from scleral buckling to PPV [22]. Due to the advancement of equipment, especially microincision vitrectomy surgery, PPV has been evolved remarkably, thus reducing operation time [23]. PPV also has fewer complications, such as diplopia and unpredictable refractory changes, than scleral buckling. Although PPV is more likely to induce cataracts, patients with AD often present with significant cataracts [6]. Cataract surgery can be performed simultaneously with PPV, and detailed examination and treatment are allowed in PPV for multiple peripheral retinal breaks even close to the ciliary epithelium.

Taken together, we suggest that this trend toward the use of PPV might also be applicable in the treatment of rhegmatogenous RD in patients with AD. However, it should be noted that the decision for proper treatment depends largely on the individual characteristics of each patient, such as the presence of PVR whether additional encircling or buckling should still be applied.

On the other hand, AD has been better controlled than before with the introduction of new treatments such as topical calcineurin inhibitor tacrolimus, and the use of rhegmatogenous RD in AD patients has declined since the 2000s [10]. As inflammation is well controlled, the postoperative inflammatory response might also be greatly reduced. This could be another reason for the higher success rate of surgery in this study, which included cases operated on within the last 5 years. It should be also noted that cases that needed reoperation were all pseudophakic in their 20s, suggesting severe AD complications. AD itself is a risk factor of rhegmatogenous RD in children [24], so that early and sufficient control of AD might be helpful for visual prognosis.

This study has several limitations related to its retrospective nature, the small number of patients included, and the lack of a control group. The surgical methods had been determined by each surgeon, so that the conclusions of this study were based on retrospective data analysis. Further prospective studies may provide further evidence for treatment guidelines for RD surgery in patients with AD.

The most important factors in determining RD surgery are preoperative clinical features, such as the presence of PVR, location of the retinal break, and extent of RD. The results of this study support that favorable surgical results can be obtained with PPV for RD even in patients with AD, if cases are properly selected.

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## References

1. Nutten S. Atopic dermatitis: global epidemiology and risk factors. *Ann Nutr Metab* 2015;66 Suppl 1:8–16.
2. Eichenfield LF, Tom WL, Chamlin SL, et al. Guidelines of care for the management of atopic dermatitis: section 1: diagnosis and assessment of atopic dermatitis. *J Am Acad Dermatol* 2014;70:338–51.
3. Shaw TE, Currie GP, Koudelka CW, Simpson EL. Eczema prevalence in the United States: data from the 2003 National Survey of Children's Health. *J Invest Dermatol* 2011;131:67–73.
4. Silverberg JI, Garg NK, Paller AS, et al. Sleep disturbances in adults with eczema are associated with impaired overall health: a US population-based study. *J Invest Dermatol* 2015;135:56–66.
5. Rich LF, Hanifin JM. Ocular complications of atopic dermatitis and other eczemas. *Int Ophthalmol Clin* 1985;25:61–76.
6. Govind K, Whang K, Khanna R, et al. Atopic dermatitis is associated with increased prevalence of multiple ocular comorbidities. *J Allergy Clin Immunol Pract* 2019;7:298–9.
7. Yoneda K, Okamoto H, Wada Y, et al. Atopic retinal detachment: report of four cases and a review of the literature. *Br J Dermatol* 1995;133:586–91.
8. Lim WK, Chee SP. Retinal detachment in atopic dermatitis can masquerade as acute panuveitis with rapidly progressive cataract. *Retina* 2004;24:953–6.
9. Oka C, Ideta H, Nagasaki H, et al. Retinal detachment with atopic dermatitis similar to traumatic retinal detachment. *Ophthalmology* 1994;101:1050–4.
10. Sasoh M, Mizutani H, Matsubara H, et al. Incidence of retinal detachment associated with atopic dermatitis in Japan: review of cases from 1992 to 2011. *Clin Ophthalmol* 2015;9:1129–34.
11. Yamamoto K, Wakabayashi Y, Kawakami S, et al. Recent trends of ocular complications in patients with atopic dermatitis. *Jpn J Ophthalmol* 2019;63:410–6.
12. Tan L, Teo L, Lee SY. Case series: bilateral rhegmatogenous retinal detachments in atopic dermatitis. *Optom Vis Sci* 2018;95:621–4.
13. Lee Y, Park WK, Kim RY, et al. Characteristics of retinal detachment associated with atopic dermatitis. *BMC Ophthalmol* 2021;21:359.
14. 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.
15. Azuma N, Hida T, Katsura H, et al. Retrospective survey of surgical outcomes on rhegmatogenous retinal detachments associated with atopic dermatitis. *Arch Ophthalmol* 1996;114:281–5.

16. Takahashi M, Suzuma K, Inaba I, et al. Retinal detachment associated with atopic dermatitis. *Br J Ophthalmol* 1996;80:54–7.
17. Matsuo T, Shiraga F, Matsuo N. Intraoperative observation of the vitreous base in patients with atopic dermatitis and retinal detachment. *Retina* 1995;15:286–90.
18. Hida T, Tano Y, Okinami S, et al. Multicenter retrospective study of retinal detachment associated with atopic dermatitis. *Jpn J Ophthalmol* 2000;44:407–18.
19. Gnana Jothi V, McGimpsey S, Sharkey JA, Chan WC. Retinal detachment repair and cataract surgery in patients with atopic dermatitis. *Eye (Lond)* 2017;31:1296–301.
20. Orlin A, Hewing NJ, Nissen M, et al. Pars plana vitrectomy compared with pars plana vitrectomy combined with scleral buckle in the primary management of noncomplex rhegmatogenous retinal detachment. *Retina* 2014;34:1069–75.
21. Baumgarten S, Schiller P, Hellmich M, et al. Vitrectomy with and without encircling band for pseudophakic retinal detachment with inferior breaks: VIPER Study Report No. 3. *Graefes Arch Clin Exp Ophthalmol* 2018;256:2069–73.
22. Hashimoto Y, Michihata N, Matsui H, et al. Recent trends in vitreoretinal surgery: a nationwide database study in Japan, 2010–2017. *Jpn J Ophthalmol* 2021;65:54–62.
23. Von Fricken MA, Kunjukunju N, Weber C, Ko G. 25-Gauge sutureless vitrectomy versus 20-gauge vitrectomy for the repair of primary rhegmatogenous retinal detachment. *Retina* 2009;29:444–50.
24. Choi M, Byun SJ, Lee DH, et al. The association with rhegmatogenous retinal detachment and paediatric atopic dermatitis: a 12-year nationwide cohort study. *Eye (Lond)* 2020;34:1909–15.