Surgical Outcomes in Rhegmatogenous Retinal Detachment at Srinagarind Hospital

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Objectives: *To evaluate the surgical outcome for patients with rhegmatogenous retinal detachment and to find out the factors influencing the anatomic reattachment and visual results.*
Material and Method: *Retrospective review of the medical records of patients for the following details: age, sex, time to diagnosis, time to surgery, phakic status, types, numbers and locations of the retinal breaks, macular status, presence of proliferative vitreoretinopathy (PVR), types of surgical procedures, anatomic reattachment and visual improvement.*
Results: *Two hundred and twelve patients were surgically treated by pneumatic retinopexy, scleral buckling, pars plana vitrectomy or combined procedures. Initial anatomic reattachment was found in 157 cases (74.06%) and final reattachment in 193 cases (91.04%). Several factors including age, phakic status, number of the retinal breaks, macular detachment, PVR and types of surgical procedures have been identified to have a correlation with the anatomic success rate. Types of surgical procedures and time to surgery within 8 weeks of detachment have also been demonstrated to have a correlation with final visual improvement. However, only types of surgical procedures had statistically significant difference. Pneumatic retinopexy had a lower anatomic reattachment rate, but obtained a higher visual improvement than did other surgical procedures. Moreover, after repeated pneumatic retinopexy or further surgical procedures, the final anatomic success rate improved from 65.52% to 92.24%.*
Conclusion: *Surgical outcomes for rhegmatogenous retinal detachment are comparable to other studies. Types of surgical procedures had a significant correlation with anatomic reattachment and final visual improvement.*

Keywords: *Rhegmatogenous retinal detachment, Pneumatic retinopexy, Scleral buckling, Pars plana vitrectomy*

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Rhegmatogenous retinal detachment (RRD), the most common type of retinal detachment, is caused by liquefied vitreous passing through a retinal break into the potential space between the sensory retina and the retinal pigment epithelium (RPE). The principles of surgery for RRD include finding all breaks, creating a chorioretinal adhesion around each break and bringing the sensory retina back to the RPE. Scleral buckling is the standard surgical procedure for this condition. Some cases, particularly those with superior breaks and minimal or no vitreous traction can be treated by pneumatic retinopexy. Pars plana vitrectomy is also useful in some selected cases to internally relieve vitreoretinal traction. Since the first case of scleral buckling procedure in 1983[1,2], the advent of vitrectomy machine in 1985 and expansible gas in 1990, both simple and complicated RRD cases have been operated on at Srinaqarind Hospital with these procedures. The objective of the present report was to evaluate the surgical outcome of these three surgical procedures for treatment of RRD patients and to find out the factors influencing the anatomic reattachment and visual results.

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Material and Method

Patients with RRD who had been surgically treated from January 1999 to December 2003 were retrospectively studied. The inclusion criteria were patients with primary RRD, non-traumatic causes and follow-up period of at least 6 months. Cases with macular hole were excluded from the present study. The medical records were reviewed for the following details: age, sex, time to diagnosis, time to surgery, phakic status, types, numbers and locations of the retinal breaks, macular status, presence of PVR, types of surgical procedures, anatomic reattachment and complications if present. Visual improvement was assessed by comparing preoperative and postoperative best corrected visual acuity The visual outcome was classified as "improved" when there was two or more lines of improvement in Snellen acuity, and vice versa. The vision was "stable" when the postoperative visual acuity was improved or worse within one line of the Snellen chart. All these data were analyzed using Pearson Chi-square test, odds ratio and 95% confidence interval. The significant difference was considered when P value was < 0.05.

Results

There were 212 medical records of RRD patients which complied to the inclusion criteria. These patients were surgically treated by pneumatic retinopexy, scleral buckling, pars plana vitrectomy or combined procedures. Anatomic reattachment was found in 157 cases (74.06%). All collecting data were analyzed to find out factors that might influence the anatomic results and visual prognosis (Table 1).

1. Patient age

Fifty percent of the patients were in the age range of 40-60 years.The younger age group (< 40 years) had a higher anatomic success rate than did the older age (> 60 years) group. However, the difference was not statistically significant (odds ratio 1.75, 95% confi-dence interval 0.78-4.24, P = 0.25).

2. Sex

There were 142 males and 70 females. Anatomic reattachment was found in 105 males and 52 females. There was no statistically significant difference in anatomic attachment between them (P = 0.96).

Table 1. Demographic data and anatomic success rate

Variables	Anatomic reattachment		p value
	No. of cases	Percent	
Age (years)			
< 40	44/54	81.48	
40-60	78/106	73.58	
> 60	35/52	67.31	0.25
Sex			
Male	105/142	73.94	
Female	52/70	74.28	0.96
Time to diagnosis			
≤ 8 weeks	145/196	73.98	
> 8 weeks	12/16	75.00	0.93
Time to surgery			
≤ 8 weeks	118/163	72.39	
> 8 weeks	39/49	79.59	0.31
Phakic status			
Phakic	147/194	75.77	
Pseudophakic	9/15	60.00	
Aphakic	1/3	33.33	0.09

3. Time to diagnosis

Patients were diagnosed as RRD within 8 weeks duration of detachment in 196 cases (92.5%). There was no statistically significant difference in anatomic success rate between within the 8 week group and longer than the 8 week group (P = 0.93).

4. Time to surgery

Patients were surgically treated within the 8 week duration of detachment in 163 cases (76.9%). There was no statistically significant difference in anatomic result between within 8 week group and longer than the 8 week group (P = 0.31).

5. Phakic status

There were 194 phakic (91.51%), 15 pseudophakic (7.08%) and 3 aphakic patients (1.41%). The aphakic patients had a lower anatomic success rate than did the phakic and pseudophakic groups, but the difference was not statistically significant (odds ratio 5.89, 95% confidence interval 0.30-349.42, P = 0.09).

6. Retinal breaks (Table 2)

The types of retinal breaks were 114 horseshoe-shaped retinal tear (53.77%), 67 atrophic round hole (31.60%), 9 operculated tear (4.25%) and 8 combined type (3.77%). The retinal break was not detected in 14 cases (6.61%). There was no statistically significant difference in anatomic reattachment rate among the different types of retinal breaks (P = 0.59).

Sixty six percent of the patients had single retinal break detected. The single break group had a higher anatomic success rate than did the multiple break group, but the difference was not statistically significant (odds ratio 1.38, 95% confidence interval 0.64-2.93, P = 0.36) There was also no statistically significant difference among different locations of retinal breaks (P = 0.72).

7. Macular status

Retinal detachments involving macula (macula-off) were found in 194 cases (91.5%). Anatomic reattachments were noted in 143 of 194 macula-off cases and in 14 of 18 patients without macular involvement (macula-on). Macula-off groups had a slightly lower rate of anatomic result than did the macula-on group, but the difference was not statistically different (odds ratio 1.25, 95% confidence interval 0.37-5.44, P = 0.71).

8. PVR (Table 3)

Preoperative PVR was found in 26 cases (12.26%). The PVR groups had a lower anatomic

Table 2. Characters of the retinal breaks and anatomic success rate

Retinal breaks	Anatomic reattachment		p value
	No. of cases	Percent	
Type (N = 212)			
Horse shaped tear (HST)	87/114	76.32	
Round hole	47/67	70.15	
Operculated tear	7/9	77.78	
HST + round hole	5/8	62.50	
Not detected	11/14	78.57	0.59
Number (N = 198)			
Single break	106/140	75.71	
Two breaks	26/36	72.22	
Three breaks	8/13	61.54	
More than three breaks	6/9	66.67	0.36
Location (N = 198)			
Superotemporal (ST)	91/121	75.21	
Inferotemporal (IT)	25/33	75.76	
Superonasal (SN)	16/24	66.67	
Inferonasal (IN)	4/6	66.67	
ST + SN	10/14	71.43	0.72

success rate than did the non-PVR group However, the difference was not statistically significant (odds ratio 1.96, 95% confidence interval 0.74-4.96, P = 0.12).

9. Surgical procedures (Table 4)

Pneumatic retinopexy was the most common surgical procedure in the present study. It was operated on in 116 cases (54.7%) whereas scleral buckling in 55 cases (25.9%), pars plana vitrectomy in 35 cases (16.5%) and combined scleral buckling and pars plana vitrectomy in 6 cases (2.8%). Pneumatic retinopexy had a significantly lower initial anatomic reattachment rate than other surgical procedures (odds ratio 2.84, 95% confidence interval 1.39-5.98, P = 0.002). However, after repeated gas injection or further surgical procedures, the anatomic success rate increased from 65.52% to 92.24% which was comparable to other procedures.

10. Final visual results

One hundred and fifty seven successfully treated cases were further analyzed. Final visual improvement in pneumatic retinopexy was significantly higher than those in other procedures (odds ratio 3.63, 95% confidence interval 1.77-7.60, P = 0.0001) (Table 5). Moreover, 26% of successfully treated cases in pneumatic retinopexy obtained postoperative vision of at least 6/18. This was also better than other procedures (odds ratio 7.27, 95% confidence interval 2.37-29.54,

Table 3. PVR and anatomic success rate

	Anatomic reattachment		p value
	No. of cases	Percent	
PVR grade C-D	16/26	61.54	
No PVR	141/186	75.81	0.12

Table 4. Types of surgical procedures and anatomic success rate

Procedures	Initial reattachment		Final reattachment	
	No. of cases	(Percent)	No of cases	(Percent)
PR	76/116	(65.52)	107/116	(92.24)
SB	47/55	(85.45)	50/55	(90.91)
PPV	28/35	(80.00)	30/35	(85.71)
PPV + SB	6/6	(100)	6/6	(100)
Total	157/212	(74.06)	193/212	(91.04)

PR = pneumatic retinopexy SB = scleral buckling PPV = pars plana vitrectomy
P value 0.002

Table 5. Types of surgical procedures and final visual improvement

Procedures	Final visual improvement		P value
	No. of cases	Percent	
PR	90/107	84.11	
SB	26/50	52.00	
PPV	22/30	73.33	
PPV + SB	3/6	50.00	
Total	141/193	73.06	0.0001

PR = pneumatic retinopexy SB = scleral buckling PPV = pars plana vitrectomy

P = 0.0001) (Table 6).

Patients who were surgically treated within 8 weeks duration of detachment had a better final visual outcome than those operated on after 8 weeks, but the difference was not statistically different.(odds ratio 1.67, 95% confidence interval 0.59-4.54, P = 0.27) (Table 7).

In 126 successfully treated patients who had been followed up for 12 months or longer, there was no significant difference in visual improvement between at 6 months and at 12 months (Table 8).

Discussion

The objectives of the RRD surgery are to permanently reattach the sensory retina to the RPE and to restore or maintain maximal visual function. Successful treatment requires surgery to close all retinal breaks and to relieve significant vitreoretinal traction. The surgical results have improved substantially since Gonin described the pathogenesis of RRD and presented a substantial number of successfully treated cases. Since that time, RRD of increasing complexity have been treated through advances in surgical technologies. At present an overall reattachment rate of at least 90% can be achievable[3-6]. In the present study the anatomic reattachment rate was 91.04% which is comparable to other previous reports[3-6].

Anatomic reattachments are influenced by a number of preoperative, intraoperative and postoperative factors. Preoperative variables have been studied most extensively, and several have been demonstrated to correlate with the anatomic success rate. Some authors reported a trend toward a lower anatomic success rate in older patients, but the difference was not statistically significant[3,6]. In the present study,

Table 6. Types of surgical procedures and final visual acuity

Procedures	Final visual acuity		
	≥ 6/18	6/18-6/60	< 6/60
PR (107)	28 (26.17%)	58 (54.2%)	21 (19.63%)
SB (50)	4 (8%)	23 (46.0%)	23 (46.00%)
PPV (30)	-	15 (50.0%)	15 (50.00%)
PPV + SB (6)	-	3 (50.0%)	3 (50.00%)

PR = pneumatic retinopexy SB = scleral buckling PPV = pars plana vitrectomy
p value 0.0001

Table 7. Time to surgery and final visual improvement

Time to surgery	Final visual improvement	
	No. of cases	percent
≤ 8 weeks	64/80	80.00
> 8 weeks	24/34	70.59

odds ratio = 1.67 (95%CI = 0.59-4.54) p = 0.27

Table 8. Final visual outcome at 6 and 12 months

	Final visual outcome	
	6 months	12 months
Improved	86 (68.25%)	89 (70.63%)
Stable	38 (30.16%)	37 (29.36%)
Worse	2 (1.59%)	-

the younger age group had a higher anatomic reattachment rate than did the older age group, but the difference was also not statistically significant. In previous reports, the sex of the patients did not seem to influence the anatomic results of reattachment surgery[3,6,7]. The present report also demonstrated no significant correlation.

In some previous studies, the duration of detachment before surgery was found to have an inverse correlation with the anatomic success rate[8,9]. However, others have not demonstrated such a correlation[6,7]. The present report also showed no significant correlation. It was believed that PVR increased with longer duration of detachment. Therefore, chronic detachments would be expected to have PVR that correlated with a lower anatomic and visual results[9]. Although the present report did not show a significant correlation between time to surgery with anatomic success rate and final visual improvement, it demonstrated a trend toward a lower anatomic success rate and less visual improvement in patients operated on after 8 weeks.

An earlier study reported an inverse correlation between the number of retinal breaks and the anatomic reattachment rate. However, no correlation was found in later report[6,8]. The present study also showed no significant correlation. Tani et al demonstrated a statistically significant correlation between retinal breaks posterior to the equator and reduction in the anatomic success rate of reattachment surgery[6]. However, locations of the retinal breaks in the present study did not showed significant correlation with the anatomic reattachment.

In some previous reports, aphakic detachments had a significantly lower reattachment rate than did phakic detachments[3,6]. This may be attributed to the higher incidence of multiple small atrophic holes or flap tears at the posterior margin of the vitreous base and more PVR in aphakic eyes[3,10]. However, others demonstrated no relationship between aphakia and anatomic success or visual outcome[6,11]. In the present study, the aphakic group had a lower anatomic reattachment rate than did the phakic group, but the difference was not statistically significant.

Retinal detachment involving macula was reported to have a lower rate of anatomic and visual results than do detachments without macular involvement[6,12]. Although the present study demonstrated a lower anatomic reattachment rate and final visual improvement in macula-off patients, the difference was not statistically different. As the duration of detachment increases, cystic spaces extend throughout the retinal thickness and the retina becomes increasingly atrophic due to permanent photoreceptor damage[6,12]. This explains why the visual recovery is less in patients with chronic macular detachment.

Three surgical procedures were used in the present study. Anatomic reattachment rate was found to be 65.52% in patients who underwent pneumatic retinopexy, 85.45% in scleral buckling, 80% in pars plana vitrectomy and 100% in combined scleral buckling and vitrectomy. This difference was statistically significant. However, after repeated pneumatic retinopexy or further surgical procedures, the final anatomic result increased to 92.24%, which was comparable to other surgical procedures.

Although pneumatic retinopexy had a lower anatomic reattachment rate, it is recommended to do it first when there is indication because the procedure is simple, safe and economiral. After failed first injection, the patients can be retreated with repeated pneumatic retinopexy or other surgical procedures to increase the anatomic reattachment rate. Furthermore, pneumatic retinopexy had a higher final visual improvement than did other surgical procedures[13]. The present study also demonstrated this higher final visual outcome.

Although several factors in the present study have a correlation with anatomic reattachment rate and visual improvement, the difference is not statistically significant. This may be attributed to too small sample size. As Srinagarind Hospital is the only tertiary eye care in the northeast, RRD patients have been referred from provincial hospitals which are rather distant from our hospital. After successful surgical treatment, most of them prefer to have postoperative follow-up at their provincial hospitals due to economic and transportation problems. This results in a smaller number of patients who met the inclusion criteria. Another limitation of the present study was the retrospective design. Further prospective study and adequate sample size are needed to demonstrate significant correlation of these factors.

In conclusion, surgical outcomes in RRD have been evaluated. Several factors including age, phakic status, number of the retinal breaks, macular detachment, PVR and types of surgical procedures have been identified to have a correlation with the anatomic success rate. Types of surgical procedures and time to surgery within 8 weeks of detachment have also been demonstrated to have correlation with final visual improvement. However, only types of surgical procedures had statistically significant difference.

Pneumatic retinopexy should be recommended to do first when there is indication. After failed first operation, repeated injection or other types of surgical procedures can be done to increase the anatomic reattachment and final visual outcome.

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ผลของการผ่าตัดรักษาโรคจอตาหลุดลอกชนิดมีรูฉีกขาดที่โรงพยาบาลศรีนครินทร์

ยศอนันต์ ยศไพบูลย์, ธรรศ สงวนศักดิ์, ธนภัทร รัตนภากร, สุธาสินี สีนะวัฒน์

วัตถุประสงค์: *เพื่อศึกษาผลของการผ่าตัดรักษาจอตาหลุดลอกชนิดมีรูฉีกขาด และวิเคราะห์หาปัจจัยที่มีผลต่ออัตราการติดกลับของจอตา และอัตราการมองเห็นดีขึ้น*

วัสดุและวิธีการ: *ศึกษาย้อนหลังจากข้อมูลเวชระเบียนของผู้ป่วยที่มารับการผ่าตัดรักษาโรคจอตาหลุดลอกชนิดมีรูฉีกขาด ในเรื่อง อายุ เพศ ระยะเวลาที่เป็นโรคก่อนการวินิจฉัย ระยะเวลาก่อนการผ่าตัด สภาพของเลนส์ตาชนิด จำนวนและตำแหน่งของรูจอตาฉีกขาด สภาพของจุดรับภาพ พังผืดของวุ้นตาและจอตา ชนิดของการผ่าตัด อัตราการติดกลับของจอตา และอัตราการมองเห็นดีขึ้น*

ผลการศึกษา: *ผู้ป่วย 212 รายได้รับการผ่าตัดด้วยวิธีการฉีดก๊าซเข้าวุ้นตา การผ่าตัดรัดลูกตา การผ่าตัดวุ้นตาและการผ่าตัดรัดลูกตาร่วมกับการผ่าตัดวุ้นตา อัตราการติดกลับของจอตาเบื้องต้น เท่ากับร้อยละ 74.06 และอัตราการติดกลับของจอตาสุดท้ายเท่ากับร้อยละ 91.04 ปัจจัยที่มีความสัมพันธ์กับอัตราการติดกลับของจอตาได้แก่ อายุ สภาพของเลนส์ตา จำนวนรูจอตาฉีกขาด จุดรับภาพหลุดลอก พังผืดของวุ้นตาและจอตา และชนิดของการผ่าตัด ปัจจัยที่มีความสัมพันธ์กับอัตราการมองเห็นดีขึ้น ได้แก่ ชนิดของการผ่าตัด และระยะเวลาก่อนผ่าตัดภายใน 8 สัปดาห์ แต่มีเพียงชนิดของการผ่าตัดเท่านั้น ที่มีความสัมพันธ์อย่างมีนัยสำคัญทางสถิติ กับอัตราการติดกลับของจอตา และอัตราการมองเห็นดีขึ้น การฉีดก๊าซเข้าวุ้นตา มีอัตราการติดกลับของจอตาต่ำกว่าการผ่าตัดวิธีอื่น แต่มีอัตราการมองเห็นดีขึ้นสูงกว่าการผ่าตัดวิธีอื่น นอกจากนั้น การฉีดก๊าซเข้าวุ้นตาซ้ำหรือการผ่าตัดซ้ำทำให้อัตราการติดกลับของจอตาสูงขึ้นจากร้อยละ 65.52 เป็นร้อยละ 92.24*

สรุป: *ผลของการผ่าตัดรักษาจอตาหลุดลอกชนิดมีรูฉีกขาด ที่โรงพยาบาลศรีนครินทร์ ไม่แตกต่างจากผลของการผ่าตัดในรายงานอื่น ชนิดของการผ่าตัดมีความสัมพันธ์ กับอัตราการติดกลับของจอตา และอัตราการมองเห็นดีขึ้นอย่างมีนัยสำคัญทางสถิติ*