Kathmandu University Medical Journal (2008), Vol. 6, No. 4, Issue 24, 466-471

Original Ariticle

Outcome of pneumatic retinopexy at a tertiary eye care centre in Nepal

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Abstract

Background: Rhegmatogenous retinal detachment is one of the commonly encountered retinal problems where timely treatment could prevent irreversible vision loss. Pneumatic retinopexy (PR) is a simple and minimally invasive procedure for retinal reattachment.

Aim: This study aimed to assess the outcome of pneumatic retinopexy in primary rhegmatogenous retinal detachment at our facility.

Study design: This was a retrospective- prospective, interventional case series.

Materials and methods: All subjects with rhegmatogenous retinal detachment who underwent pneumatic retinopexy at Tilganga Eye Centre of Nepal from January 2002 to June 2007 were included in this study.

Results: A total of 32 cases were included in the study. The mean age of patients was 55.2 year (SD=11.0). The majority of cases (62.5%) presented within two weeks of symptoms with blurring of vision in 90% of cases. Pre-operatively, 56.3% (18) patients had a best corrected distance visual acuity of <6/60. Retinal detachment involving less than two quadrants consisted of 37.5% (12). A single retinal break was present in 78.1% (25) of cases and 87.5% (28) of the retinal breaks were located in the superotemporal quadrant. The macula was attached in 37.5% (12) of the cases. Sulfurhexafluoride and Perfluoropropane were used in 68.8% (22) and 31.3% (10) respectively. The average follow up period was 1.02 years (range one month to four years). The retina was completely attached in 81.3% (26) of cases at the last follow up. The best corrected distance visual acuity of 6/18-6/60 was found in 40.6% (13) of subjects in the last follow up. There was a transient rise in intraocular pressure in 6.3% (2) of subjects after the procedure.

Conclusion: The anatomical success rate following pneumatic retinopexy is quite high (81.3%) with good visual recovery and less morbidity translating to higher productivity for the patient. This procedure, being quicker than the alternatives, will also save surgeon's time making PR a good choice for managing primary rhegmatogenous retinal detachment in countries like Nepal where resources are scarce.

Key words: Rhegmatogenous retinal detachment, retinal break, pneumatic retinopexy, Nepal

Retinal disorders are the third leading cause of bilateral blindness (3.3%) and the eighth leading cause among unilateral blindness (3.8%) in Nepal[1]. Among them, Retinal Detachment (RD) is one of the common retinal problems in which timely treatment can prevent irreversible vision loss. A previous study in Nepal showed that 70% of the vitreoretinal procedures were performed exclusively for rhegmatogenous retinal detachment (RRD)[2]. Trauma, pseudophakic eyes and high myopia were the major risk factors for RRD[2].

Pneumatic retinopexy (PR) was first proposed by Dominguez (1985) and later by Hilton and Grizzard on 1986[3] as an alternative surgical procedure to scleral buckling (SB) for treatment of primary RRD. When compared with SB, PR reduces the likelihood of ocular trauma, avoids hospitalization and has fewer complications.

PR is indicated as the appropriate surgical treatment of primary RRD where one or more retinal tears are no larger than one clock hour and are located within the superior eight clock hours of the retina, without any proliferative vitreoretinopathy changes[4]. This procedure is also used to treat recurrent retinal detachment following a failed SB.

In developing nations like Nepal, PR is not a commonly performed procedure because most patients do not seek medical attention soon enough following development of the visual problem. This is probably due to lack of awareness, poor transportation infrastructure and

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scarcity of specialized eye care facilities. To the best of our knowledge, there has been no data published on the outcome of PR in Nepal. We hope this study will provide some baseline data on the outcomes of PR performed at a tertiary eye care centre in Nepal.

Materials and methods

This was a retrospective- prospective, interventional case series that was executed at Tilganga Eye Centre, a tertiary eye care centre in Nepal. All patients who underwent pneumatic retinopexy from January 2002 to June 2007 were included as subjects in this study. Subjects who were not followed up within one month were excluded from the study. Hospital records were reviewed to obtain demographic data, presenting complaints, duration, and other associated ocular and systemic problems.

The examination findings recorded were visual acuity, anterior segment findings, severity of detachment, types as well as site of retinal tears, and associated proliferative vitreoretinopathy changes. Posterior segment examination was done with the help of Volk 90 D and 20D lens.

All the subjects were evaluated and decision for PR was made by the vitreoretinal surgeon. All the subjects included in the study were primary cases of RRD with recent bullous RRD without any proliferative vitreoretinopathy changes demonstrating retinal break(s) in the superior 8 clock hours and the extent of any retinal break(s) not exceeding one clock hour. Patients unable to co-operate in proper post-operative positioning were excluded from the study.

The procedure was done under either retrobulbar or peribulbar local anesthesia. Intraoperatively, cryotherapy was applied at the retinal breaks in all cases. Intravitreal injection of 100% Perfluoropropane (C3F8) of 0.3cc or Sulfurhexafluoride (SF6) of 0.5cc was given. Paracentesis was done intraoperatively in cases with a high intraocular pressure (IOP). After intravitreal gas injection, patients were initially kept in a face down position for five to ten minutes. The head position was maintained depending upon the site of retinal break(s) so that gas bubbles would come in contact with the retinal break for minimum of five days, 16 hours a day or until the retina was completely attached. Postoperatively, patients were prescribed a combination of dexamethasone and chloramphenicol topical eye drops four hourly to start with. This dose was tapered and stopped within one month. Tropicamide eye drops were also prescribed for two weeks. Systemic Ibuprofen 400 mg was prescribed as needed. Those cases that had high IOP were treated with anti-glaucoma drugs depending upon the severity. None of the patients were admitted to a bed.

Subsequent laser or reinjection of gas was given where the volume of gas was thought to be inadequate. Visual acuity, anatomical attachment and significant complications were noted postoperatively until their last follow up.

Ethical approval was obtained from the institutional review board of the Tilganga Eye Centre. Verbal as well as written consent was taken before surgery.

Data collection sheets were prepared for data collection. Data was edited and coded then entered in SPSS software version 11.5. Descriptive statistics were generated by SPSS and the Fisher's exact test was done in Epi Info 2000. A p-value of less than 0.05 was considered as significant.

Results

A total of 32 eyes from 32 patients were included in the study. The mean age was 55.2 years (SD=11.0) ranging from 30 to 73 years. About one-third of the patients were in the age range of 50-59 years (31.3%) followed by 60-69 years (28.1%). More males (62.5%) were presented in the study than females (37.5%).

The most common presenting complaint was blurring of vision (90.62%), followed by floaters (6.3%) and then flashes of light (3.1%). The majority of patients presented within one week of symptoms (37.5%). High myopia (>6 dioptres) was found in 6.3% of subjects. Aphakia, pseudophakia and subluxated lens had similar distribution (3.1% each). Subtotal RD accounted for the majority of cases (46.9 %), whereas localized superior RD involving less than two quadrants was present in 37.5% of cases. In 78.1% of cases, there was a single retinal break, while the remainder (21.9%) had multiple breaks involving less than one clock hour. The retinal tears were primarily superotemporal (87.5%), followed by superonasal (9.4%) and superior (3.1%). The macula was not involved in the RD for 37.5% of cases. SF6 was used in the majority of cases (68.75%) as compared to C3F8 (31.3%).

The majority of patients had a preoperative best corrected visual acuity (BCDVA) of less than 6/60 (56.3%) with BCDVA of 6/6 - 6/18 present in 25% of patients. There was marked improvement of vision after surgery, evidenced by a BCDVA of 6/18-6/60 in 40.6% of cases at the last follow up. 18.8% of cases maintained a good vision of 6/6-6/18 (Table 1, 2).

The retina was completely flat in 53.1% of the cases on the first post- operative day follow up. At the last follow up, the retina was attached in 81.3% of cases.

The average follow up period of our study cases was 1.02 years, which ranged from one month to four years.

In 71.8% of the cases, the retina was attached with a single procedure. Subsequent laser therapy was given in four cases. Reinjection of gas was needed in three cases where the gas bubble was determined to be inadequate. Including these cases, the total anatomical attachment success rate increased to 81.3%. Anatomical attachment had not been achieved in 18.8% of the cases at their last follow up. Among these retinopexy failure cases, two were managed with scleral buckling and four cases with Pars plana vitrectomy and internal temponade with silicon oil.

In our study, we found an increased failure rate in subjects older than 50 years, subjects with subtotal RD, multiple retinal tears, or high myopia (>6 Dioptre) and in subjects who underwent PR with C3F8 gas. However, none of these factors were statistically significant.

In 75.0% of cases, the intra-operative and post-operative course was uneventful without any complications. Increased intraocular pressure was found in 6.3% of subjects and failure of the surgery occurred in nearly 18.8% of cases (Table 3, 4, 5).

Table 1: General characteristics

Variables		**Frequency**	**Percentage (%)**
Age (Years) (n=32)	30-39	2	6.3
	40-49	8	25.0
	50-59	10	31.3
	60-69	9	28.1
	70-79	3	9.4
Duration of symptoms in weeks (n=32)	0-1 wk	12	37.5
	1-2 wk	8	25.0
	2-4 wk	6	18.8
	4-12 wk	2	6.2
	>12 wk	4	12.5
Extent of retinal detachment (n=32)	Subtotal	15	46.9
	Localized superior (≤2 quadrants)	12	37.5
	Total RD	5	15.6
Site of retinal breaks (n=32)	Superior	1	3.1
	Superior nasal	3	9.4
	Superior temporal	28	87.5
Condition of macula (n=32)	Off	20	62.5
	On	12	37.5
Types of gas used (n=32)	Perfluoropropane (C3F8)	10	31.3
	Sulfurhexafluoride (SF6)	22	68.7

Table 2: Visual acuity before and after surgery (n=32)

Description		**6/6-6/18 (n/p)**	**<6/18-6/60 (n/p)**	**<6/60-3/60 (n/p)**	**<3/60-pl (n/p)**
Uncorrected	Pre-op	6 (18.8)	5 (15.6)	1 (3.1)	20 (62.5)
	Day 1 post-op	6 (18.8)	10 (31.3)	3 (9.4)	13 (40.5)
	Last follow-up	6 (18.8)	13 (40.6)	1 (3.1)	12 (37.5)
Best Corrected	Pre-op	8 (25.0)	4 (12.5)	2 (6.3)	18 (56.3)
	Day 1 post-op	7 (21.8)	11 (34.4)	3 (9.4)	11 (34.4)
	Last follow-up	6 (18.8)	13 (40.6)	1 (3.1)	12 (37.5)

n/p= number (percentage)

Table 3: Anatomical success after pneumatic retinopexy

Retina	**Day 1 post-op** (n/p)	**Last follow up** (n/p)
Flat	17 (53.1)	26 (81.3)
Sub retinal fluid	15 (46.9)	6 (18.7)
Total	32 (100)	32 (100)

Table 4: Pattern of surgical procedures (n=32)

Procedures	**Number**	**Percentage**
Single injection of gas	23	71.9
Reinjection of gas	3	9.3
Vitrectomy with Silicon Oil	4	12.5
Scleral buckling	2	6.3

Table 5: Factors associated with success and failure of retinal attachment

Factors associated	Success (n/p)	Failure (n/p)	p value
Age group			
Age <50 Years	8 (80.0)	2 (20.0)	1.00
Age ≥50 Years	18 (81.8)	4 (18.2)	
Duration of presentation			
0-2 weeks	18 (90.0)	2 (10.0)	0.17
> 2 weeks	8 (66.7)	4 (33.3)	
Extent of RD			
Subtotal/ total RD(> 2 quadrants)	17 (85.0)	3 (15.0)	1.00
Localized Superior (≤ 2 quadrants)	10 (83.3)	2 (16.7)	
Retinal tear			
Single	21 (84.0)	4 (16.0)	0.59
Multiple	5 (71.4)	2 (28.6)	
Type of gases			
C3F8	6 (60.0)	4 (40.0)	0.06
SF6	20 (90.9)	2 (9.1)	
Condition of lens			
Phakia	24 (80.0)	6 (20.0)	0.86
Pseudophakia/ Aphakia	2 (100)	0	
Myopic status			
Minimal or no myopia	26 (86.2)	4 (13.8)	0.03
High Myopia	0	2 (100)	

Discussion

To the best of our knowledge, this is the first reported study on outcome of pneumatic retinopexy in Nepalese patients. The average age of patients in our study, 55.2 years (range 30 to 73 years) is similar to the average age reported in USA[5] which was 55 years (range 30-81). Males also composed a higher proportion of their study subjects (66%). This is similar to our findings of 62.5% male patients. Likewise, the average age and sex were comparable with the similar studies done in West Bengal[6] and Germany[7].

Our single operation success rate was 71.9%. Three cases needed reinjection of gas due to inadequate quantity in first procedure. The anatomical success rate was 81.3% at the last follow up. Our success rate was comparable to those reported in other studies where it ranged from 66-83% [5,8, 9,10,11,12,13,14].

In a randomized controlled trial of PR versus SB, Das et al[6] found that anatomic results of SB and PR are not significantly different in selected cases, with final post

operative visual acuity being better with PR which was consistent with many other literatures. Since its first description, PR has attracted more and more interest and has become established as the first choice procedure for certain kinds of RD in the USA and Canada[15].

The macula was attached in 37.5% of our cases which is similar (36%) to Lisle et al reported[14] whereas it was 62% in the series reported by the Zaidi et al.[5]

Most of our cases were phakic (93.8%) as is comparable to other studies[5,14]. High myopia was found in 6.3% of cases which is lower than the Zaidi et al (18%)[5].

The majority of our patients (56.3%) had a pre operative BCDVA of less than 6/60 where as one fourth had BCDVA of 6/6-6/18. Following PR, there was marked improvement in BCDVA of 6/18-6/60 in 40.6% cases and 18.8% of cases maintaining good vision of 6/6-6/18 at the last follow up.

Tornambe[8] found 6/12 or better visual acuity in 86% of eyes in his series. Similarly, Kulkarmi et al[16] described greater than or equal to 6/18 visual acuity in 73.6% in the macula off RD. Ziadi et al[5] found average visual acuity of 6/6p at the final follow up, versus 6/24 preoperatively. Another study in west Bengal[6] showed 6/12 or better vision in 88% of their series although they have not discussed pre-operative macular involvement. The lower average visual acuity in our series may be the result of poor pre-operative vision due to late presentation and pre-existing cataract, as the majority of subjects belong to an older age group.

The average follow up period of our cases was 1.02 years (ranging from one month to four years). This is similar to the follow- up period reported by Zaidi et al[5](14.9 months with a range of 1 to 66 months) but follow up period of this study was shorter than reported by Lisle et al[14] (8.1 years with a range of 7.3 to 9.2) and Eter et al[7] (6.35 years). However in a series by Das et al [6], they only followed up cases for six months.

Further analysis was done regarding factors associated with success and failure cases in our study group. We found an increased failure rate to be associated with the following risk factors; patient's age greater than 50 years, late presentation (after two weeks of symptoms), high myopia, use of C3F8 gas, multiple retinal breaks and subtotal RD. Excepting high myopia (p=0.03), other factors were not statistically significant in our series. Our findings on factors associated with failure of retinal attachment were similar to those reported by other studies[2,9, 13] although in this series the data is not adequate (i.e. >5 subjects) to make a solid inference about the population.

The intraoperative and postoperative course was uneventful in most of our cases (75%). We found a transient increase in intraocular pressure in 6% and failure for the retinal attachment in nearly 19% of our patients during the course of our study period. Our findings on these are comparable with many other reported studies[5, 8,9, 10,11,12,13,14].

Conclusion

The anatomical success rate following pneumatic retinopexy is quite high (81.3%) with good visual recovery and less morbidity translating to higher productivity for the patient. This procedure, being quicker than the alternatives, will also save surgeon's time making PR a good choice for managing primary rhegmatogenous retinal detachment in countries like Nepal where resources are scarce.

We recommend the further studies with a larger sample size and prolonged follow up in the future.

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