

Access this article online

Quick Response Code:



Website:

www.ojonline.org

DOI:

10.4103/ojo.OJO_206_2017

Giant retinal tear retinal detachment etiologies, surgical outcome, and incidence of recurrent retinal detachment after silicone oil removal

Eman Abo Taleb, Manish P. Nagpal¹, Navneet S. Mehrotra¹, Kalyani Bhatt¹, Sangeeta Goswami¹, Abdulrahman Noman²

Abstract:

PURPOSE: The purpose of this study was to evaluate etiologies, management, and outcomes of patients with giant retinal tears (GRTs) undergoing primary surgery at a tertiary referral center.

METHODS: This was a retrospective, consecutive case series of 94 patients with at least 3 months follow-up after silicone oil removal (SOR). Fifty-seven eyes (60.6%) underwent vitrectomy, 36 eyes (38.3%) underwent combined vitrectomy with buckling, and 1 eye (1.1%) underwent scleral buckling. Perfluorocarbon liquid (PFCL) heavy liquid to flatten GRT flap intraoperative has been used then PFCL air exchange then air-silicon exchange in all eyes undergoing vitrectomy. Fellow eye was observed for retinal detachment (RD).

RESULTS: Idiopathic cause constitutes 47 eyes (50%), in which 25 eyes (26.6%) are myopic and 22 eyes (23.4%) have a history of trauma. Eighty-five eyes (90.4%) achieved anatomic success. Visual acuity at the last follow-up was at least 20/400 in 71 eyes (75.5%) of patients. Recurrent RD after SOR was found in 21 eyes (22.3%), of which 50% had proliferative vitreoretinopathy grade C (PVR-C) or more ($P = 0.03$) and 20% had GRT size more than 180° ($P = 0.04$). Pars plana vitrectomy (PPV) alone ($P = 0.89$) or combined PPV with buckling ($P = 0.98$) has no significant correlation with recurrent RD. Twenty-one percent of the fellow eye had RD.

CONCLUSION: Idiopathic cause constitutes the majority (50%). Patients with GRT who underwent surgery achieved a high anatomic success rate. PVR-C or more and GRT size more than 180° remain the most significant risk factor for recurrent RD after SOR, whereas PPV alone or combined PPV with buckling has no significant correlation with recurrent RD.

Keywords:

Giant retinal tear, recurrent retinal detachment, silicone oil removal, surgical outcome

Introduction

A giant retinal tear (GRT) is defined as a full-thickness retinal break extending circumferentially for 3 clock h (90°) in the presence of a posteriorly detached vitreous.^[1] GRTs are rare; their incidence has not been well established in the literature. The true incidence of GRTs is difficult to assess given their rarity, but one recent

study estimates 0.094 per 100,000 of the general population per year.^[2]

GRTs may arise spontaneously, but approximately 25% of cases occur in association with ocular trauma.^[3] The fellow eye of patients who have experienced a spontaneous giant retinal tear is at an increased risk of developing GRTs, retinal detachment (RD), or both.^[9]

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

How to cite this article: Taleb EA, Nagpal MP, Mehrotra NS, Bhatt K, Goswami S, Noman A. Giant retinal tear retinal detachment etiologies, surgical outcome, and incidence of recurrent retinal detachment after silicone oil removal. *Oman J Ophthalmol* 2020;13:117-22.

Regional Hospital for Vitreoretina and Eye Care, ²Magrabi Eye Hospital, Sana'a, Yemen, ¹Retina Foundation and Asopalav Eye Hospital, Ahmedabad, Gujarat, India

Address for correspondence:

Dr. Eman Abo Taleb, Regional Eye Hospital, Bait Baos-Alkamseen Street, Sana'a, Yemen. E-mail: emanabotaleb@yahoo.com

Submitted: 02-Nov-2017
Revised: 27-Jan-2019
Accepted: 16-Apr-2020
Published: 02-Nov-2020

Previous studies have reported various risk factors for GRTs; these include trauma, high myopia, aphakia and pseudophakia, and young age.^[3]

The surgical approach for GRT has always been a challenge for vitreoretinal surgeons, as these patients have a high risk of proliferative vitreoretinopathy (PVR) formation (40%–50%).^[5] Many approaches^[4,5] to repositioning and fixating the inverted retinal flap, reattaching the retina, and reducing the risk of redetachment have been reported with varying success rates. The use of perfluorocarbon liquids (PFCLs) demonstrated by Chang *et al.*^[2] to unfold and flatten the inverted retina provides several advantages.

Despite improvement in the surgical maneuvers and tamponade agents, recurrence of the detachment still occurs due to several factors, such as reopening of the tear, formation of a new tear, or extension of the existing tear due to concurrent PVR.^[6] PVR is one of the late complications of giant retinal breaks and the leading cause of surgical failure.^[6] Increased access to the exposed retinal pigment epithelium allows greater spillage of cells and pigment into the vitreous cavity and on the retinal surface, thereby increasing the risk of PVR.^[7]

In this study, we studied the etiology and the demographic and clinical characteristics of GRT and the safety and efficacy of pars plana vitrectomy (PPV) or combined PPV with encircling scleral buckle, 360° laser retinopexy, and postoperative silicone oil tamponade in management. In addition, we sought to study complications of the surgery and the risk factor for redetachment and determine the final anatomic and visual outcomes of the surgery. We also studied the incidence of RD in fellow eyes of patients with GRT.

Methods

This retrospective study was performed on consecutive 94 patients (94 eyes) who underwent RD surgery over a 10-year period from May 2004 to November 2013 at Retina Foundation and Asopalav Eye Hospital, Ahmedabad, India. Informed written consent was obtained from each patient to do PPV and scleral buckle or only PPV for the treatment of GRT. Medical records of these patients were reviewed, and patients with GRTs were identified. Datasheets were designed and patient information including age, sex, lens status (phakic, pseudophakic, or aphakic), and laterality (right or left eye) were noted. The patients were stratified into two age groups: older than 30 years and 30 years of age or younger. History of trauma and myopic refractive errors of the patients were taken into account. Each patient underwent complete preoperative ophthalmic examinations including best-corrected visual acuity (BCVA) using the Snellen

chart, slit-lamp biomicroscopy, intraocular pressure (IOP) measurement using noncontact tonometer, fundus examination by indirect ophthalmoscopy, and B-scan ultrasonography if required.

For statistical analysis, Snellen visual acuity was converted to the logarithm of the minimum angle of resolution (logMAR). Mean was used for the description of quantitative data, and percentages were used for qualitative data. Univariate analyses, such as the Chi-square test and Fisher's exact test, were used to compare qualitative data, whereas the two-sample *t*-test was used to compare quantitative data. Statistical analyses were done using SPSS statistical software (version 19.0; SPSS, Inc., Chicago, IL, USA). For all statistical tests, $P \leq 0.05$ was considered significant.

Surgical technique

All eyes were operated under general or local anesthesia. At the beginning of surgery, 360° peritomy was done followed by slinging of the four rectus muscle and placement of an encircling equatorial band no. 240 (2.5 mm) in eyes with inferior PVR but not tied till the retina was flattened. Conventional 3-port PPV procedure using a 23-gauge or 25-gauge vitrectomy system coupled with contact wide-field viewing system. Vitrectomy was performed, and then, PFCL heavy liquid was injected into the vitreous cavity to unroll the retina and displace the subretinal fluid. This was followed by diathermy of the edges of the tear, excision of the anterior flap, and smoothing of the edges of the posterior flap. Meticulous removal of the peripheral vitreous base under wide-field viewing with indentation with all efforts made to remove as much vitreous as possible. Under PFCL tamponade, 360° laser (several rows extended up to the retinal periphery) was applied to seal the retina. Finally, PFCL air exchange followed by silicone oil (1000) air exchange was done. The height of the buckle aimed to be relatively low and broad to minimize radial fold formation. All patients were instructed for postoperative face down for 10 h daily for at least 7 days. All surgeries were done by one surgeon. In phakic eyes, the lens was spared in all cases. This treatment was a part of standard patient care and not specific for the study. Follow-up examinations were done at postoperative day 1 and months 1, 3, and 6. Silicone oil removal (SOR), with or without cataract surgery, was planned following signs of oil emulsification. All patients were followed up regularly for at least 3 months after silicone oil removal with complete ophthalmological examination each visit with special attention to BCVA, lens status, IOP, and peripheral retinal status. Complete anatomical success was defined as complete retinal attachment after silicone oil removal at the 3rd postoperative month, whereas incomplete success was considered in eyes where the retina remained detached under silicone oil or redetected after SOR.

Results

Ninety-four eyes (94 patients) with GRT were included in the current study. The baseline characteristics, available for all patients, are summarized in Table 1.

The mean age was 36.1 ± 10.6 years (range: 5–76 years). Thirty-five patients (37%) were 30 years or younger and 59 patients (62.8%) were older than 30 years. Male gender was more prevalent group (85 patients, 90.4%) than female gender (9 patients, 9.6%). There was no difference between right and left eyes 47 (50%) in each. Most GRTs were idiopathic 47 eyes (50%), myopia in 25 eyes (26.6%), and trauma in 22 eyes (23.4%) [Figure 1].

Hereditary vitreoretinopathy was found in 3 eyes (6.7%), previous cataract surgery in 38 eyes (84.4%), and previous refractive surgery in 4 eyes (8.9%).

The clinical characteristics at presentation are summarized in Table 2.

The mean presenting vision was $\log\text{MAR } 2.20 \pm 0.94$. A significant proportion of eyes presented with vision of less than 20/200 in 82 eyes (87.2%) and only 4 eyes (4.3%) presented with vision 20/40 or better. The majority had total RD with detached fovea at the time of presentation 78 eyes (83%) and 16 eyes (17%) had nasal subtotal RD with attached fovea. PVR was found in 82 eyes (87.2%) of which PVR grade C or greater were found in 27 eyes and no PVR in 12 eyes (12.8%). The circumference of the GRT was between 90° and 180° in 58 eyes (61.7%), between 180° and 270° in 31 eyes (33%), and more than 270° in 5 eyes (5.3%) [Table 3].

Table 1: Baseline characteristics

Baseline characteristics	Number of eyes
Mean age	36.77±15.74 (5-76)
Age group (%)	
≤30	35 (37)
>30	59 (62.8)
Gender (%)	
Male	85 (90.4)
Female	9 (9.6)
Eye (%)	
Right	47 (50)
Left	47 (50)
Risk factor (%)	
Idiopathic	47 (50)
Myopia	25 (26.6)
Trauma	22 (23.4)
Other risk factor (%)	
Hereditary vitreoretinopathy	3 (6.7)
Previous cataract Sx	38 (84.4)
Previous refractive Sx	4 (8.9)
Mean duration of symptoms	19.78±29.89 (1-180)

Fellow eye

The median presenting BCVA for the fellow eye was better than 20/40 in 52 (71.3%) and less than 20/200 in 14 (19.2%). Nontraumatic, noniatrogenic GRT was seen in % fellow eyes, vitreoretinal disease was noted in 30 (31.9%) white without pressure was seen in 22.3% and lattice degeneration was seen in 9.6%.

Fifteen eyes (21%) of the fellow had previous/current RD: 8 eyes (11.1%) are non-GRT RD and 7 eyes (9.7%) are GRT RD. Only 1 eye (1.4%) has GRT without RD [Table 3].

Surgical treatment

The intraoperative management techniques used in the surgical repair of these cases are presented in Table 4. Majority of the GRTs (57 eyes, 60.6%) were treated by PPV, and 36 eyes (38.3%) were treated by combined scleral buckling and PPV. One eye (1.1%) macula on GRT was treated with cryotherapy and scleral buckle surgery. The retina in this eye remained attached at the last available follow-up visit (9 months) without any additional procedure.

Outcomes

Outcomes data were available for 94 eyes, as summarized in Table 5. Primary retinal reattachment (after the first operation) was 75 eyes (80%), and the final retinal reattachment (after one or multiple operation) was 85 eyes (90.4%), with the final visual acuity more than 20/400 in 71 eyes (75.5%).

Most of the postoperative complications were related to silicone oil, with cataract formation being the most common (24 eyes, 25.2%). Recurrent RD was found in 21 eyes (22.3%). The mean time for SOR was 10.69 ± 10.17 months, with range between 6 and 72 months.

About 50% of recurrent RDs had PVR-C or more which mainly result from the traction of fibrotic PVR tissue that usually occurred at area away from the original GRT with significant correlation ($P = 0.03$) and only 20% of the recurrent RDs had GRT size more than

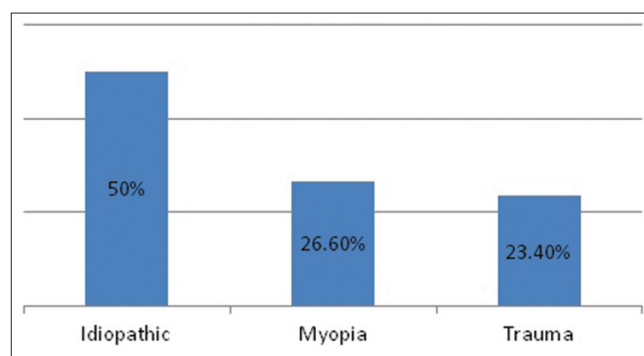


Figure 1: Risk factor

Table 2: Clinical characteristics at presentation

Preoperative clinical characteristics	Number of eyes
Presenting vision 20/40 or better (%)	4 (4.3)
Presenting vision worse than 20/200 (%)	82 (87.2)
Lens status (%)	
Phakic	52 (55.3)
Pseudophakic	34 (36.2)
Aphakic	6 (6.4)
Dislocated lens	2 (2.1)
Retinal detachment (%)	
Fovea off	78 (83)
Fovea on	16 (17)
Size of GRT (%)	
Between 90° and 180°	58 (61.7)
Between 180° and 270°	31 (33)
≥270°	5 (5.3)
PVR (%)	
Yes	82 (87.2)
No	12 (2.8)
PVR-C or greater (%)	
Yes	27 (28.7)
No	67 (71.3)

PVR: Proliferative vitreoretinopathy

Table 3: Clinical characteristics of the fellow eye at presentation

Clinical characteristics	Number of eyes
Presenting vision 20/40 or better (%)	52 (71.2)
Presenting vision worse than 20/200 (%)	14 (19.2)
Retinal finding (%)	
Normal	56 (77.8)
Previous/current non-GRT RD	8 (11.1)
Previous/current GRT RD	7 (9.7)
GRT without RD	1 (1.4)

GRT: Giant retinal tear, RD: Retinal detachment

Table 4: Management data

Operative data	Number of eyes
Surgery (%)	
Pars plana vitrectomy	57 (60.6)
Cryobuckle	1 (1.1)
Combined buckle and vitrectomy	36 (38.3)
Retinectomy (%)	6 (6.4)
Relaxing retinectomy (%)	3 (3.2)
Tamponade (%)	
Silicon	92 (97.9)
PFCL	1 (1.1)
No tamponade	1 (1.1)

PFCL: Perfluorocarbon liquid

180° ($P = 0.04$). There was no significant correlation between the incidence of recurrent RD after silicon oil removal and the type of surgery P value was 0.98 in combined vitrectomy with encirclage buckling and P value was 0.89 in vitrectomy alone both P values are >0.05 . Raised IOP requiring treatment was found in 19 eyes (20.2%) [Figure 2].

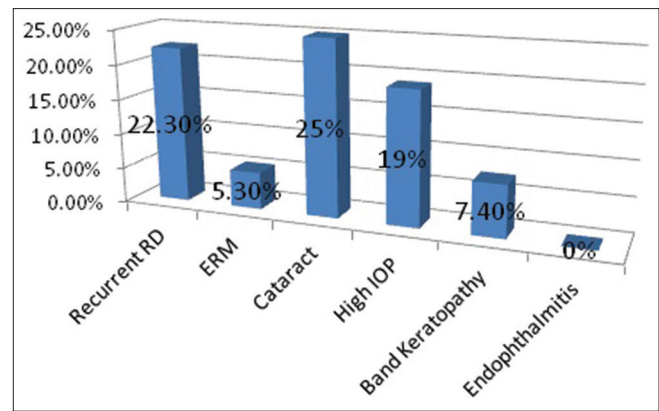


Figure 2: Postoperative complications

Discussion

A GRT is a full-thickness retinal break that extends circumferentially for 90° or more in the presence of posterior vitreous detachment. GRTs are thought to be most commonly idiopathic or spontaneous. These have been estimated to represent 28%–78% of all GRTs.^[1,2] The wide range of incidence may be due, at least partly, to the definition of idiopathic GRT used in previous (and possibly outdated) studies. In some case series, idiopathic GRTs were considered to be those that were nontraumatic, whereas in others, idiopathic referred to the absence of any known predisposing factors, including high myopia and previous intraocular surgery.^[1,2] If eyes with predisposing factors other than trauma (such as high myopia and previous intraocular surgery) had also been excluded, then it is likely that the incidence of true idiopathic GRT would be less than that reported in the various case series. In the present study, GRT was defined as idiopathic in the absence of predisposing factors, myopia of any degree, and trauma. According to this definition, the incidence of idiopathic GRT was 50%. The other predisposing factors for the development of a GRT in the present study were myopia (26.6%), trauma (23.4%), and hereditary vitreoretinopathies (6.7%).

In our study the mean age was 36.8 years with about 37% are under or equal the age of 30 year with predominantly male preponderance (90.4%) this consistent with data in previous reports.^[2,8] Morteza *et al.*^[3] evaluated major risk factors for GRTs such as high myopia, trauma, age, and lens status, and they found that young age was the only significant risk factor associated with GRTs where the incidence of GRT in age 30 or less is 34% which is comparable to our result. Their data showed that for each year increase in age, the incidence of GRTs decreased by 6%, and they conclude that the fellow eyes of patients with nontraumatic GRTs, especially patients younger than 30 years of age, may be considered at high risk, and therefore,

Table 5: Outcome

Postoperative outcome	Number of eyes
Visual acuity (%)	
More than 20/400	71 (75.5)
Less than 20/400	23 (24.5)
Final anatomy (%)	
Attached	85 (90.4)
Not attached	9 (9.6)
Postoperative complication (%)	
Cataract	24 (25.2)
Recurrent RD	21 (22.3)
High IOP	19 (20.2)
Band keratopathy	7 (7.4)
Epiretinal membrane	5 (5.3)
Endophthalmitis	0

RD: Retinal detachment, IOP: Intraocular pressure

prophylactic treatment may be warranted in such case.^[3]

The proportion of eyes presenting with a BCVA of 20/40 or better was only 4.3%, within the 0%–50% range observed in other published studies.^[8,11–13] However, the majority (87.2%) presented with BCVA worse than 20/200, and this was compatible with the result in other studies which is ranged 33%–91%.^[2,15] These relatively bad levels of presenting vision in the present study may be considered a reflection of the comparatively high number of fovea-off detachments (83%), >180° GRT (33%), and PVR grade C (PVR-C) or greater (28.7%). Furthermore, other publications have reported fovea-off RDs in 31%–94%, GRT >180° in 6%–62%, and severe PVR in 9%–62%.^[8,14]

Although a small randomized clinical trial for GRT with PVR-C or greater found no difference in the 5-year anatomic reattachment, visual outcomes, and complications between postoperative tamponade with silicone oil and long-acting perfluoropropane (C3F8) gas,^[2] silicone oil is still the tamponade of choice in most centers across the world.^[16,17] This preference is reflected in the present study, where silicone oil was found to have been used in 97.9% of cases, even though only 28.7% presented with PVR-C or worse.

In the present study, the retinal reattachment rate for GRT was 80% after the primary procedure with the final reattachment of 90.4% at the last follow-up. This percentage is similar to the published rates in the literature of 70%–90% reattachment after the first operation and 74%–97% at the final visit for GRT retinal reattachment.^[2,16,17] These results are also comparable to the 82.0% (95% confidence interval, 77.9–85.7) retinal reattachment rate after primary surgery by retinal specialists.^[18]

In our study final BCVA of 20/400 or better was found in 75.5%. This result was comparable to the final BCVA

outcomes in the previously published series where final BCVA of 20/400 or better was found in 84.9%.^[19]

The fellow eye of patients with GRTs is at an increased risk of GRT and RD. In a large series of 228 fellow eyes of nontraumatic GRTs in a study by Freeman,^[2] the 124 eyes that did not receive prophylactic treatment had an 11.3% incidence of GRT over a mean follow-up of 3.7 years.^[2,13] Furthermore, RDs not associated with GRT may occur in up to 36% of fellow eyes.^[1,3,20] It should be noted that in the present study, among the nontraumatic and noniatrogenic cases at presentation, 9.7% were fellow eyes of patients who had a history of GRT, compared with 6.6% in the Freeman 4 series. In addition, present or previous RD, retinal breaks (other than GRT) were observed in 11.1% of fellow eyes of nontraumatic and noniatrogenic GRT. Although somewhat lower than the 31%–81% reported in the literature,^[1,2,20] the rate still represents a high proportion of fellow eyes at risk of visual loss due to RD. Currently, there is no strong evidence in the form of a RCT or a case–control study to support or refute the use of 360° prophylactic treatment for fellow eye of patients with unilateral GRT.^[20]

Fellow eye with preexisting retinal tears and PVDs can go into RD in spite of laser prophylactic. When PVD is not detectable or partial PVD is present, the progression of posterior vitreous separation can account for retinal tear and arising in the formerly healthy area.^[21] The most important postoperative complication in giant retinal surgery is recurrent detachment, which is principally due to the development of PVR. This complication developed in 49.4% and 31.5% of patients in the two large multicenter series,^[21,22] whereas it is lesser in the present study (22.3%) because of the highly efficient new instruments and machines.

In the present study, 22% had recurrent RD, of which 50% had PVR-C or more *P* value 0.03 and 20% had GRT size more than 180° *P* = 0.04

Visually significant postoperative epimacular membranes developed in 7.4% and 15% of patients in the previous series,^[8,23] which was comparable to our study (5.3%).

Conclusion

Nowadays, in the era of PFCL and new instruments, patients with GRT who underwent surgery achieved a high anatomic success rate. PVR-C or more remains the most significant risk factor for recurrent RD. PPV alone or combined PPV with encirclage buckling has no significant correlation with recurrent RD.

Financial support and sponsorship

This study was financially supported by Dr. Manish Nagpal.

Conflicts of interest

There are no conflicts of interest.

References

- Schepens CL, Dobbie JG, McMeel JW. Retinal detachments with giant breaks: Preliminary report. *Trans Am Acad Ophthalmol Otolaryngol* 1962;66:471-9.
- Ang GS, Townend J, Lois N. Epidemiology of giant retinal tears in the United Kingdom: The British Giant Retinal Tear Epidemiology Eye Study (BGEES). *Invest Ophthalmol Vis Sci* 2010;51:4781-7.
- Mehdizadeh M, Afarid M, Haqiqi MS. Risk factors for giant retinal tears. *J Ophthalmic Vis Res* 2010;5:246-9.
- Schiff W, Chang S, Reppucci V. Surgical management of giant retinal tears. In: Guyer DR, editor. *Retina-Vitreous-Macula*. Vol. 2. Pennsylvania: WB Saunders; 1999. p. 1338-49.
- Ghosh YK, Banerjee S, Savant V, Kotamarthi V, Benson MT, Scott RA, *et al.* Surgical treatment and outcome of patients with giant retinal tears. *Eye (Lond)* 2004;18:996-1000.
- Chang S, Lincoff H, Zimmerman NJ, Fuchs W. Giant retinal tears. Surgical techniques and results using perfluorocarbon liquids. *Arch Ophthalmol* 1989;107:761-6.
- Campochiaro PA, Kaden IH, Vidaurri-Leal J, Glaser BM. Cryotherapy enhances intravitreal dispersion of viable retinal pigment epithelial cells. *Arch Ophthalmol* 1985;103:434-6.
- Kertes PJ, Wafapoor H, Peyman GA, Calixto N Jr., Thompson H. The management of giant retinal tears using perfluoroperhydrophenanthrene. A multicenter case series. *Vitreon Collaborative Study Group. Ophthalmology* 1997;104:1159-65.
- Scott IU, Murray TG, Flynn HW Jr., Feuer WJ, Schiffman JC; Perfluoron Study Group. Outcomes and complications associated with giant retinal tear management using perfluoro-n-octane. *Ophthalmology* 2002;109:1828-33.
- Batman C, Cekic O. Giant retinal tears after pars plana vitrectomy. *Eye (Lond)* 1998;12 (Pt 1):163-4.
- Kreiger AE, Lewis H. Management of giant retinal tears without scleral buckling. Use of radical dissection of the vitreous base and perfluoro-octane and intraocular tamponade. *Ophthalmology* 1992;99:491-7.
- Ie D, Glaser BM, Sjaarda RN, Thompson JT, Steinberg LE, Gordon LW. The use of perfluoro-octane in the management of giant retinal tears without proliferative vitreoretinopathy. *Retina* 1994;14:323-8.
- Hoffman ME, Sorr EM. Management of giant retinal tears without scleral buckling. *Retina* 1986;6:197-204.
- Chen CH, Tsai MH, Su CC, Kou HK, Kao ML, Tsai SH, *et al.* Results of 12-year clinical study of giant retinal tear. *Chang Gung Med J* 2001;24:633-9.
- Drivers Medical Group. At a Glance Guide to the Current Medical Standards of Fitness to Drive. Swansea: DVLA. Available from: <http://www.dvla.gov.uk/media/pdf/medical/aagv1.pdf>. [Last accessed on 2009 Aug 13].
- Glaser BM. Treatment of giant retinal tears combined with proliferative vitreoretinopathy. *Ophthalmology* 1986;93:1193-7.
- Kapetanios AD, Donati G, Pournaras CJ. Idiopathic giant retinal tears: Treatment with vitrectomy and temporary silicone oil tamponade. *J Fr Ophtalmol* 2000;23:1001-5.
- Thompson JA, Snead MP, Billington BM, Barrie T, Thompson JR, Sparrow JM. National audit of the outcome of primary surgery for rhegmatogenous retinal detachment. II. Clinical outcomes. *Eye (Lond)* 2002;16:771-7.
- Gonzalez MA, Flynn HW Jr., Smiddy WE, Albin TA, Tenzel P. Surgery for retinal detachment in patients with giant retinal tear: Etiologies, management strategies, and outcomes. *Ophthalmic Surg Lasers Imaging Retina* 2013;44:232-7.
- Freeman HM. Fellow eyes of giant retinal breaks. *Mod Probl Ophthalmol* 1979;20:267-74.
- Ang GS, Townend J, Lais N. Interventions for prevention of giant retinal tear in the fellow eye. *Cochrane Database Study Syst Rev* 2012;2:CD006909.
- Mastropasqua L, Carpineto P, Ciancaglini M, Falconio G, Gallenga PE. Treatment of retinal tears and lattice degenerations in fellow eyes in high risk patients suffering retinal detachment: A prospective study. *Br J Ophthalmol* 1999;83:1046-9.
- Freeman HM. Giant retinal tears: 207 cases from the Perfluoron study. *Am Acad Ophthalmol Vitreoretin Update* 1997; p. 168-71.