Original Article

Vitreon, a Perfluorocarbon Liquid as Vitreous Substitute in Retinal Detachment Surgery

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Purpose: To assess the role of perfluoroperhydrophenanthrene (vitreon) PFCL as an internal tamponade agent in complicated retinal detachment with regard to anatomical reattachment, visual outcome and complications.

Material and Methods: This study was conducted in the Department of Ophthalmology J.P.M.C, Karachi, for 1 year, from July 2000 to June 2001, in 30 eyes of 30 patients. Patients with complicated retinal detachment who underwent three ports pars plana vitrectomy with vitreon (perfluoro-perhydro-phenanthrene) as an internal tamponade agent.

Results: The mean age was 31.9 years. 7 patients were female (23.3%) and 23 were male (76.6%). 20 patients were phakic (66.6%), 3 patients were aphakic (23.3%) and 7 patients were pseudophakic. Eight patients were myopes (26.6%). Ten patients had retinal detachment with PVR Grade “C” in which break could not be localized preoperatively, 16 patients had inferior retinal detachment with posteriorly located breaks (53.3%), 1 patient had inferior tractional retinal detachment (3.3%) and 3 patients had retinal detachment associated with giant retinal tear (10%). Majority of patients had visual acuity up to counting fingers. 16 eyes (53.3%). Vitreon was used as an internal tamponading agent, which was later on replaced by silicone oil. Redetachemnt of retina due to PVR (26.6%) was the commonest postoperative complication. The overall anatomical success rate was (93.3%) and visual success rate was (63.3%).

Conclusion: Vitreon can be safely tolerated by the eye and is a good intra oprative hydrokinetic tool to flatten the retina.

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Complicated retinal detachment has always been a challenge for vitreoretinal surgeons. The last few years have seen major advances in viteroretinal surgery. With the introduction of high-tech vitrectomy and intraoperative vitreoretinal tools, vitreoretinal surgeons are now in a better position to reattach the retina.

Besides conventional techniques[1-6] various methods have been used to facilitate complicated retinal detachment surgery such as endophotocoagulation, internal drainage, internal tamponade and heavier than water liquids. In complicated retinal reattachment surgery, removal of subretinal or epiretinal membranes and elimination of other tractional elements is of immense importance. By using perfluorocarbon liquids this goal can be easily and successfully achieved. Once the membranes and all tractional forces are thoroughly removed, internal tamponade keeps the retina attached for considerable period so that in the mean time adhesions can develop between retina and retinal pigment epithelium.

The commonest cause of redetachement is proliferative vitreoretinopathy. The elimination of all tractional forces on the retina is the key to successful retinal reattachment[7,8].

MATERIAL AND METHODS

This Quasi experimental interventional study was carried out in the Department of Ophthalmology, J.P.M.C. Karachi, for 1 year from July 2000 to June 2001. Patients with complicated retinal detachment were recruited from J.P.M.C. Eye OPD. Non-probability convenient sampling was done.

Inclusion Criteria: The inclusion criteria for the study was retinal detachment with PVR Grade C, Inferior rhegmatogenous retinal detachment, retinal detachment associated with posteriorly located breaks, tractional retinal detachment, retinal dialysis and retinal detachment with giant retinal tear.

Exclusion Criteria: The exclusion criteria were retinal detachment with superiorly located breaks, superior retinal detachment, retinal detachment due to intraocular foreign body and vitreous hemorrhage due to diabetic retinopathy.

All patients were admitted in the eye ward. A detailed history was obtained on a printed history proforma. Particular attention was given to the history of any existing or previous ocular disorder, past history of ocular trauma, history of any ocular surgery particularly cataract, glaucoma or retinal reattachment surgery. All patients were asked about any systemic disease especially diabetes mellitus, hypertension and family history of ocular disorders. All patients were examined preoperatively, peroperatively and postoperatively.

Best corrected visual acuity was recorded. The extent of retinal detachment was recorded, PVR was graded according to the classification of PVR proposed by retina Society in (1991)[9-15]. The detachment was drawn on a fundus chart showing details of retinal detachment, PVR and tears. The color codes were used as described by Kanski (1999)[1].

In addition to material used for conventional retinal detachment surgery (360° encirelement band, radial and segmental circumferential explant) vitreous cutter, PFCL (Vitreon), Silicone Oil (1000C.S) were made available in every case.

Patient's Profile

Thirty eyes of 30 patients were included in this study. The ages of the patients ranged from 11 years to 70 years (mean 31.9 years) (Table 1). Out of thirty patients, 7 were female (23.3%) and 23 were male (76.6%) (Table 2). Twenty patients (66.6%) were phakic, three patients were aphakic (10%) and seven patients were pseudophakic (23.3%) (Table 3).

Eight patients were myopes (26.6%). Ten patients had retinal detachment with PVR Grade "C" (33.3%), sixteen patients had inferior retinal detachment with posteriorly located breaks (53.3%). Out of these sixteen patients, one patient had a macular hole, one patient had inferior tractional retinal detachment (33.3%) and three patients had retinal detachment secondary to gaint retinal tear (10%) (Table 4). Visual status was hand movement in 13 patients (43.3%), counting finger in 16 patients (53.3%) and light perception in 1 patient (3.33%) preoperatively (Table 5). Out of 30 patients, breaks were not localized preoperatively in 10 patients due to extensive folding, fibrosis and total retinal detachment, however they were localized intraoperatively.

Table 1: Age distribution

Minimum age	11 years

Maximum age	70 years
Mean age	31 years

Table 2: Sex distribution

	No. of Patients n (%)
Male	23 (76.6)
Female	7 (23.3)

Table 3: Refractive status

	No. of Patients n (%)
Phakic	20 (66.6)
Aphakic	3 (10)
Pseudophakic	7 (23.3)

Operative Procedure

Under all aseptic measures, in L/A or G/A, 360° encirclement band was passed under the muscles and was tied with watzke's sleeve and sutured 12mm behind the limbus.

After performing core vitrectomy. PVD induced PFCL (vitreon) perfluoroperhydrophenanthrene was injected slowly by 20 gauge needle, quantity used varied from 1.5-3 cc average 3.5cc, 1mm above the optic disc. Tip of the needle was kept within the center of the bubble to prevent dispersion of the bubble. Vitreon bubble help in opening the funnel of the retinal detachment, flattening the retina and help to define further areas of traction which were removed by performing the vitrectomy and then continued peripherally and anteriorly to remove all the traction. In eyes with anterior PVR, vitrectomy with seleral indentation was done. Epiretinal membranes which remained were removed with intraocular scissors and forceps.

Table 4: Indication of surgery

Cause	**No. of Patients n (%)**
Total retinal detachment with PVR "C"	10 (33.3)
Subtotal inferior retinal detachment with post-eriorly located breaks	16 (53.3)
Inferior tractional retinal detachment	1 (3.33)
Giant retinal tear	3 (10)

Table5: Preoperative visual acuity

Visual acuity	**No. of Patients n (%)**
H.M	13 (43.3)
Finger Counting	16 (53.3)
PL +ve	1 (3.33)

Table 6: Postoperative visual acuity

Visual acuity	**No. of Patients n (%)**
6/24-6/60	13 (43.3)
5/60-1/60	11 (36.6)
HM-PL +ve	6 (20)

In case of inferior tractional retinal detachment, after PFCL (vitreon) injection, traction bands were devided with vitrectomy, endo-cautery was done on firovascular band to prevent intraocular bleeding. In case of retinal detachments associated with giant retinal tear, vitreon (PFCL) bubble filled the eye from posterior to anterior direction thus unfold the rolled over posterior flap of the tear.

In all cases, subretinal fluid was not drained externally but drained internally through the pre-existing retinal tear due to its high specific gravity.

After the flattening of retina, endolaser done around the break and plomb applied externally at the break site. Explants and 360° encriclement band were sutured with 5/0 ethibond. Inferior iridectomy at 6 O'Clock (Ando Basal Iridectomy) was done in aphakic patients. Vitreon was then replaced by silicone oil (1000C.S). Quantity of silicone oil varied from 4-7cc, average being 5.5cc. scleral ports and conjunctive were closed with 6/0 vicryl.

Subconjuctival injection of Gentamicin 20mg and Dexamethasone 4mg was given to all patients at the end of procedure. Eyes were atropinized and antibiotic drops and ointments were instilled. Systemic antibiotics and steroids were given for 5 days. Dressing was removed after 24 hours.

Patients were instructed to maintain head down posture for at least 10-15 days. Visual acuity, anterior segment examination, intraocular pressure and state of retina were noted during the patients stay in hospital for 4 to 5 days.

The patients were followed in outpatients department after 1 week, 1 month, 3 months and 6 months. Proper record of visual acuity, ocular findings, IOP and fundus findings were maintained.

RESULTS

At the end of procedure, retina was attached in all patients (100%). During operation, a few problems were noted and managed accordingly. These complications have been shown in Table 7. During Surgery one patient developed lens touch (3.33%) which was obscuring the view, so lensectomy was done and IOL was implanted at the end of surgery. One patient developed choroidal detachment, which was managed by injecting more vitreon in the eye. Two patients (6.66%) had iatrogenic retinal tear, after completing the vitrectomy, endolaser was done around those breaks. During surgery, intraocular bleeding occurred in one patient (3.33%) from fibrovascular tissue, so more vitreon was injected to raise IOP, that led to stoppage of bleeding, later on endocautery was done at the bleeding site.

Anatomical success was defined as "Retinal reattachment beyond the scleral indentation" and visual success was defined as "improvement in visual acuity postoperatively". The overall anatomical success rate was 93.3% (28 eyes). Out of these 28 eyes, 22 eyes (73.3%) reattached with primary surgery, while 6 eyes (20%) underwent secondary surgery (Table 8). The overall visual success rate was achieved in 19 eyes (63.3%), in 6 eyes (20%) visual acuity remained unchanged and another 5 eyes (16.6%) the visual acuity dropped to less than the preoperative level (Table 9).

Table 7: Preoperative complications

Complications	**No. of Patients n (%)**
Lens touch	1 (3.3)
Choroidal detachment	1 (3.3)
Iatrogenic retinal tear	2 (6.6)
Intraocular bleeding	1 (3.3)

Table 8: Anatomical success rate (28 eyes 93.3%)

	No. of Patients n (%)
Retina attached	28 (93.33)
With Primary Surgery	22
With Secondary Surgery	6
Retina not attached	2 (6.6)

Table 9: Visual success rate (19 eyes, 63.3)

	No. of Patients n (%)
Post operative VA same as preoperative level	5 (20)
Postoperative VA improved to 2 or more lines	19 (63.3)
Postoperative VA worse than the preoperative level	5 (16.6)

Table 10: Postoperative complications

Complications	**No. of Patients n (%)**
Redetachment	8
Raised IOP	4
Cataract	4
Macular Pucker	2

Due to severe PVR, Retina of 8 patients (26.6%) was redetached. Out of 8 patients with redetachment, vitrectomy with scleral indentation and membrane peeling was done in 5 patients while vitrectomy with retinectomy in remaining 3 patients. With these extensive surgical maneuvers, retina of 6 patients became attached while 2 remain detached. Until last follow up of these 8 patients, visual acuity of four patients (13.3%) improved, while in remaining 4 patients (13.3%) vision decreased to less than preoperative level. Raised intraocular pressure 25-30 mmHg average 27.5 mmHg was noted in four eyes (13.3%) due to silicone oil in A/C, after removal of silicone oil and topical autiglaucoma medication intraocular pressure became normal. Four patients (13.3%) developed cataract. Phaco+IOL implantation was done in these patients. Two eyes developed

hypotony (6.66%) while two patients developed macular pucker (6.66%) that was noted after six months of follow up. One patient (3.33%) developed keratopathy due to silicone oil in A/C, silicone oil removed but vision not improved due to permanent severe corneal damage (Table 10).

After the mean follow up of 7 month the postoperative visual acuity ranged from 6/24 – 6/60 in 13 patients (43.3%), from 5/60 – 1/60 in 11 patients (36.6%) and from hand movement to light perception in 6 patients (20%) (Table 6).

In most of the patients, preoperative visual acuity was from PL-HM in 14 patients (46.6%) and CF 1 Feet-CF 3feet in 16 patients (53.3%) (Table 5). In such patients, with severely and markedly decreased vision, the postoperative vision improved with functional success rate of 63.3% (Table 9).

CONCLUSION

Our study on complicated retinal detachment surgery using vitreon (perfluoroperhydrophenanthrene) shows that vitreon can be safely tolerated by the eye and is a good intral operative tool to drain SRF internally and to flatten the retina. The study also shows that there is a very large gap between patients and physicians and between general ophthalmologist and vitreoretinal surgeons. Because of illiteracy, patient do not understand and realize the nature and outcome of the complicated R/D. Delay in referral of these patients by general ophthalmologists and also undue delay on part of the patients are factors that contribute in the chronicity and severity of the disorder. vitreontinal surgery is a very expensive, time consuming and yet less rewarding procedure, it requires a teamwork and a joint venture to make it affordable, less expensive and thankful job.

We need more co-operations from our society, concerned authorities and associations to help needy patients and public hospital. Patients should be educated and made to realize their problems and nature of the vitreoretinal surgery. Though vitreoretinal surgery is expensive, time consuming, back breathing and thankless job, even then need more ophthalmologists to take part in the services of humanity and hopeless needy patients.

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