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VITREO RETINAL DISEASES - III

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Results of First within 100 Vitreoretinal Cases Operated by A Starter Surgeon in an Advanced VR Set Up in A Tertiary Centre

Dr. Gitumoni Sharma, Dr. Deepshikha Agrawal

Vitreoretinal surgery undoubtedly has a steep learning curve—one that requires awareness, technical skill, and humility. There was a clear learning curve associated with every surgery. Adjustment to surgical technique and prior experience with a technique seemed to flatten the learning curve.

The field of retina is constantly changing. In the past 10 years, there has been an exponential increase in the number of practice-changing prospective, randomized trials published in the field of retina. Advancements in pharmacotherapy and laser technology are similarly occurring at an ever-increasing pace. Thankfully, modern vitreoretinal surgical techniques have reduced overall complication rates, but when complications occur, they can have devastating visual results.

Learning how to avoid complications and knowing what steps to take if they do occur takes years of practice. As we are learning the different surgical approaches of our attendings, it is important to follow up on these patients to know their long-term outcomes. With cautious surgical technique, the complications can be avoided.

In this study, the surgeries and its associated complications and their cause was tried to be analysed. All the diagnosis and surgeries were done by a beginner surgeon and whenever necessary only expert opinion was taken.

MATERIALS AND METHODS

Retrospective analysis was done, of the case sheets of 77 patients who had undergone vitreoretinal surgery and management by a single beginner surgeon independently in an advanced vitreoretinal set-up in a tertiary eye care. The case sheets numbers were taken out from the OT register of those cases which were operated by the beginner surgeon from 29th Nov. 2014- 1st April 2014. The different surgeries done in each cases and the diagnosis was recorded. The visual acuity was noted at preoperative, first
Further, data were entered into MS-Excel sheets. Further, there were divisions into 7 more groups depending on their diagnosis and treatment undergone as Retinal Detachment undergone vitrectomy +/- belt buckle, Open globe injury repaired, Endophthalmitis undergoing vitrectomy, Vitrectomy for Proliferative Diabetic Retinopathy with Tractional Retinal Detachment and Vitreous Haemorrhage, Vitrectomy for vitreous haemorrhage due to other causes, Nucleus drop undergone vitrectomy. The categories having the maximum number of cases were found out. Outcome of surgeries were found out in terms of Visual acuity at presentation, 1st post-operative day and at final visit of 6 weeks. The complications if any were noted.

Statistical calculation was done using Microsoft Excel and Statistical Software SPSS 160.0. Visual acuity was seen in Logmar chart and the values were changed to decibel for ease of calculation. ANOVA test was done in each group to see the significance of variation. Paired sampling was done in each group. P-value <0.05 was considered to test the 5% level of significance.

**RESULTS**

There were a total of 77 eyes operated between 29th Nov. 2014- 1st April 2014 by a beginner surgeon who had started as independent vitreoretinal surgeon since 17th Nov. 14

These were again divided into 7 groups for ease of analysis (Table 1) Retinal detachment undergoing vitrectomy with and without scleral buckle were 18(23.3%), open globe injuries getting repaired were 10(12.98%), endophthalmitis undergoing vitreous biopsy and vitrectomy were 11(14.28%), Vitrectomy for Proliferative diabetic retinopathy with tractional retinal detachment were 11(14.28%), Vitrectomy done for vitreous haemorrhage due to other causes were 7(9.09%), nucleus drop undergoing

<table>
<thead>
<tr>
<th>Table 1: 7 groups of patients operated</th>
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<tbody>
<tr>
<td>1. RD undergone vitrectomy +/- belt buckle-</td>
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<tr>
<td>2. Open globe injury repaired</td>
</tr>
<tr>
<td>3. Endophthalmitis undergoing vit</td>
</tr>
<tr>
<td>4. Vitrectomy for PDR TRD VH</td>
</tr>
<tr>
<td>5. Vitrectomy for vit haem due to other causes</td>
</tr>
<tr>
<td>6. Nucleus drop undergone vitrectomy</td>
</tr>
<tr>
<td>7. Other minor interventions like inj, prp +/- Phaco</td>
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<td><strong>Total</strong></td>
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vitrectomy were 3(3.89%) and other minor procedures like intravitreal injections with cataract surgery after +/- pan retinal photocoagulation were 17(22.07%).

3(3.89%) patients were one eyed. One had cataract with total rhegmatogenous retinal detachment with PVR changes. He underwent BB+Vit+SOI and then PhacoIOL+SOR in second stage. His BCVA improved from PL in the preoperative period to 1.3 Logmar in the final check-up. The other two were of paediatric age groups. The first one was chorioretinal colobomatous retinal detachment who underwent BB+ Vit + SOI and then later SOR + 14% C₃F₈ injection. BCVA in the final visit was 0.5 Logmar from HM+ve. The other was a macular on total rhegmatogenous retinal detachment who first underwent BB+Vit + SOI and then SOR in second stage. BCVA in this case improved from CFCF to 0.6 Logmar.

Figure 1: Graph showing the logMar Visual acuity in pre-op, 1 day po, and final PO in RD.

Figure 2: Graph showing the logMar Visual acuity in pre-op, 1 day po, and final PO in open globe injuries.

Figure 3: Graph showing the logMar Visual acuity in pre-op, 1 day po, and final PO in Endophthalmitis.

Figure 4: Graph showing the logMar Visual acuity in pre-op, 1 day po, and final PO in PDR TRD VH.

Figure 5: Graph showing the logMar Visual acuity in pre-op, 1 day po, and final PO in VH.

Figure 6: Graph showing the logMar Visual acuity in preop, 1 day po, and final PO in nucleus drop.
1 patient of the PVR with total RD surgery did not improve due to the macular hole developing later Figure 1.3 (3.89%) patients in the open globe group had phthisis bulbi. Inspite of the globe repair being done successfully and though the globe was salvaged, these patients had irreparable retinal detachment seen on the B-Scan in the first post-operative day Figure 2.

2(2.25%) patients in the open globe group did not improve after the successful repair. One patient had persistent PL vision due to traumatic optic nerve injury. Another patient had prexisting total corneal opacity due to which he had persistent HM vision. Figure 2.

3(3.89%) in the endophthalmitis group each had phthisis bulbi. One patient was of corneal tear repaired from elsewhere with endophthalmitis due to aspergillus fungus, the other patient was also post-operative (cataract surgery done elsewhere) endophthalmitis with fusarium and yet another had delayed bleb related endophthalmitis with Gram Positive Cocci with choroidal detachment. Figure 3. 1(1.29%) patient had subsilicon retinal detachment who was in paediatric age group and had gram negative and gram positive endophthalmitis following injury by pencil.

Only 1 (1.29%) case of PDR TRD had redetachment and undergone silicon oil exchange. Another 2(2.25%) patients were operated on advanced stage of PDR and vision did not improve significantly after surgery Figure 4. 1(1.29%) case each in Vitreous haemorrhage and others did not improve due to optic atrophy in one and recurring vitreous haemorrhage in the other. Figure V. Others category included patients who were treated for either macular oedema or plus/minus cataract. The nonimproving vision in all these 15 (19.48%) cases were because of the severity at presentation and no surgery related complications were noted in any of the case. No patients had redetachment after SOR. All the surgeries were performed with either 23 gauge or 25 gauge Constellation vitrectomy system.

Although, the lines plotted shows final visual acuity to be better, but ANOVA showed significance (p<0.05) in retinal detachment group and the open globe injury group. Paired sampling t-test was significant in final visual acuity at the post-operative period in retinal detachment, open globe injury, endophthalmitis and PDR TRD groups. This shows that individually, the case did better in most of the cases after the surgery. Variation was not significant in the other groups probably because of fairly good presenting visual acuity or not an excellent postoperative visual acuity post-operatively. Paired sampling was not significant in the other three groups because of this two reasons and also for a relatively less number of cases.

**DISCUSSION AND CONCLUSION**

From this study it appears that with improved technological advances in
vitreoretinal surgeries, beginners also can have a reasonably good outcome of the cases managed and the learning curve can be flattened to some extent. The chances of complications are also minimized. Of course, the basic knowledge acquired during fellowship is important. And, this has to be very well supported by a confident anaesthesiologist and a very good assisting team.

REFERENCES


Comparison of OCT and Fundus Autofluorescence Findings in Central Serous Chorioretinopathy

Dr. Shroff Rahul Ashok, Dr. Anand A Shroff

Central serous chorioretinopathy (CSCR) is a disorder characterized by serous retinal detachment and/or RPE detachment associated with leakage of fluid through the RPE into the subretinal space, presumably due to hyperpermeability of the underlying choroid. Optical coherence tomography (OCT) is an important tool to assess the size and elevation of the serous retinal detachment (SRD) and evaluate changes in the RPE and outer segments of the photoreceptors. Fundus Autofluorescence (FAF) provides functional images by employing stimulated emission of light from the accumulated lipofuscin and provides clues of the pathobiology of CSCR. The purpose of this study was to evaluate if fundus autofluorescence findings correlated well with OCT findings in patients with CSCR.
MATERIALS AND METHODS
This is a retrospective analysis of 21 eyes of 21 patients with idiopathic central serous chorioretinopathy. Patients with other macular disorders like choroidal neovascularization, IPCV, retinal vascular disorders and intraocular inflammation were excluded. None of the patients were using systemic steroids. Each patient underwent BCVA, fundus photography, OCT and fundus autofluorescence photography. Statistical analyses was done using Chi-square test and Student t test.

RESULTS
The mean age was 43 years. 15 patients had acute CSCR while 6 patients had chronic CSCR. The male:female ratio was 17:4. All eyes had serous detachment of the neurosensory retina. The median vision in the acute CSCR group was 6/6 partial while the median vision in the chronic CSCR group was 6/9. The mean central macular thickness (CMT) was 401 micron (95%CI 332U to 470U). The neurosensory detachment was higher in patients with acute CSCR and was 450 microns (95%CI 362U to 537U) compared to chronic CSCR which was 320 microns (95%CI 218U to 423U). (p-value = 0.038). In the acute CSCR group(15/21), on OCT a Pigment Epithelium Detachment(PED) was seen in 6 cases and RPE proliferation seen in 5 cases. Thickening of the posterior surface of retina and elongation of the outer segments of photoreceptors was seen in 13 of the 15 eyes. On fundus autofluorescence(FAF), in the acute group, PED with central ring of hypo autofluorescence surrounded by a ring of hyper autofluorescence was seen in all 6 cases and corresponded to the PED seen on OCT. Hypoautofluorescence with patches of hyper autofluorescence were seen in 7 cases and areas of extrafoveal hyper autofluorescence were seen in 2 cases.

In the chronic CSCR group, OCT showed shallow serous detachment and thinning of posterior surface of retina in all the 6 cases of chronic CSCR. PED was seen in 3 cases and corresponded to the location of PED seen on OCT. 5 of the 6 eyes had mottled hyper autofluorescence.

In the fellow eye, areas of hypo autofluorescence were seen in 10 of 21 eyes and corresponded to the RPE thinning seen on OCT. Mottled hypo and hyper autofluorescence were seen in 2 eyes.

DISCUSSION AND CONCLUSION
Reduced autofluorescence in acute CSCR was encountered in previous studies due to the presence of subretinal fluid while areas of hyper autofluorescence may be seen corresponding to photoreceptor elongation and damage seen on OCT. In chronic CSCR, areas of hypo autofluorescence corresponding to RPE atrophy were seen on OCT while areas of hyper
autofluorescence were seen due to unphagocytosed photoreceptor outer segments. Thus fundus autofluorescence provides a multimodal imaging approach to evaluate changes in the photoreceptors and RPE in acute and chronic central serous chorioretinopathy.

REFERENCES

An Innovative, Cost Effective and Safe Approach to Premacular Subhyaloid Hemorrhage

Dr. Kashyap Patel, Dr. Shreya Shah, Dr. Mehul Ashvin Kumar Shah, Dr. Ruchir Mehta

Premacular subhyaloid haemorrhage refers to blood accumulation in the subhyaloid or the retrohyaloid space, which lies between the posterior hyaloid face and the internal limiting membrane of the retina. Premacular subhyaloid haemorrhage has a circular shape in beginning and later assumes a hemispherical configuration with a straight upper margin due to the effect of the gravity and typically is boat shaped. It can occurs in vascular disorders such as proliferative diabetic retinopathy, branch retinal vein occlusion and retinal macroaneurysm. It may also occur in valsalva retinopathy and in association with haematological
disorders. Major conventional treatment options are observation (to allow spontaneous clearance) and vitrectomy. The spontaneous reabsorption rate is so slow, taking several months to years. The toxicity potential of blood may cause macular damage, epiretinal membrane formation, macular traction and retinal detachment resulting in permanent visual loss. Nd:YAG laser can produce a defect in the posterior hyaloid/internal limiting membrane allowing rapid diffusion of hemorrhage into the vitreous gel thus clearing the visual axis and allowing faster absorption of blood and can protect from all complication.

MATERIALS AND METHODS

Frequency doubled Nd:YAG laser posterior hyaloidotomy with The VISULAS YAG II plus; Zeiss system was used. After full pupillary dilatation and topical anesthesia, central mirror of a Goldmann three mirror contact lens was used to focus the Frequency doubled Nd:YAG aiming beam so that an opening in the posterior hyaloids membrane near the inferior edge (i.e. apex of the globular subhyaloid hemorrhage) avoiding retinal blood vessels and fovea could be made. Frequency doubled Nd:YAG laser applied in posterior hyaloid. Finally achieve the needed aperture through the posterior hyaloid membrane. Pre and post treatment examination included visual acuity on Snellen’s chart, fundus examination by indirect ophthalmoscopy and slit lamp biomicroscopy with +90 D Volk lens for posterior pole examination. A detailed peripheral retinal examination with indirect ophthalmoscope and scleral indentation was also done to rule out any other peripheral retinal lesion or retinal vascular diseases. After laser treatment patient was advised head end elevated position till the blood cleared from the visual axis. The patient was asked to followed up at 3 days 1 week and 3 weeks after procedure. Conservative management involved regular follow-up of the patients without any surgical intervention until spontaneous resolution of the hemorrhage was complete.

Case History

17 years male presented with sudden blurred vision in the left eye that since 2 days. He did not give any significant history of trauma or known systemic illness for which he is under treatment. Ophthalmological examination revealed visual acuity to be 6/6 right eye and 2/60 in the left eye. Slit-lamp biomicroscopy revealed a normal anterior segment in ach eye. Intraocular pressure was 11.3 mm Hg bilaterally. Fundoscopy of the left eye revealed a round, well circumscribed, partially dark red haemorrhage covering the macula and posterior pole (Figure 1).

The shape of the haemorrhage was round, well circumscribed. There was
a fluid level in the upper part of the haemorrhage. Fundoscopy was completely normal in the right eye. As we don’t have hemaltologist so We consulted the patient with physican for any systemic condition but physical examination and laboratory investigations including complete blood counts, bleeding and clotting times, peripheral smear and platelet normal. The anterior surface of the haematoma was opened with Nd:Y AG laser with 300m Wenergy inferiorly at the apex. Blood sequesturated under the posterior hyaloid membrane immediately under the influence of the gravity.

The patient was prescribed weaker steroid eye drop flurometholone four times per day for 1 week and oral steroid prednisolone 1mg/kg/d for 1 week and asked to follow up after 1 week. On 1 week follow up, the visual acuity of the patient improved to 6/12p, biomicroscopic examination was bilaterally normal and intraocular pressure measurements were 14 mmHg bilaterally. At fundoscopy preretinal haemorrhage obscuring the macula had cleared completely and slight turbidity of retina secondary to vitreal dissemination of the haemorrhage (Figure 3).

**DISCUSSION**

Drainage of premacular subhyaloid haemorrhage into the vitreous with an frequency doubled Nd:YAG laser was successfully achieved without any clinical evidence of damage to the underlying retina or
choroid. This is quite similar with the results of other series\textsuperscript{2,4} which resulted in hastened improvement of vision to normal or premorbid level. Puthalath\textsuperscript{5} used frequency doubled Nd:YAG laser (532 nm) to treat subhyaloid haemorrhage of different causes. They noticed poor visual improvement in proliferative diabetic retinopathy associated with clinically significant macular oedema. Eyes with premacular subhyaloid haemorrhage resulting from V alsalva retinopathy had a good visual recovery. Complete intravitreal drainage of the blood occurred within a week following Nd: YAG laser hyaloidotomy and visual improvement occurred within one week. Pretreatment duration of premacular subhyaloid haemorrhage seems to be of prognostic importance. Visual improvement was near normal (6/6 to 6/9) Clinical examination revealed no evidence of retinal or choroidal hemorrhage, retinal pigment epithelial changes, from frequency doubled Nd: YAG laser treatment. As blood, hemoglobin, and iron have a toxic effect on the retina.\textsuperscript{6} 1 week after Laser Hyaloidotomy. Note only very little residual blood in macular region. It is justificable to drain this blood in order to prevent macular damage and other blinding complications.

**CONCLUSION**

Frequency doubled Nd:Yag Laser hyalotomy is the simple safe and effective way of treatment for dense premacular subhyaloid haemorrhage causing marked vision loss. This can avoid the need of invasive vitreoretinal surgery and its complications.

**REFERENCES**

A Case Series Reviewing the Technique of Interface Vitrectomy

Dr. Minu Ramakrishnan, Dr. Nitin Saini, Nitin Saini, Ajay Dudani

Management of a case of retinal detachment associated with proliferative vitreoretinopathy has always been controversial. The silicone oil study proposed that overall silicone oil was superior to sulphur hexafluoride gas and roughly equivalent to perfluoropropane in management of retinal detachment with proliferative vitreoretinopathy.¹

The incidence of recurrent retinal detachment associated with PVR after the initial management with vitrectomy with membrane peeling with silicon oil injection is 7 to 8%.² Different methods have been proposed for the management of recurrent retinal detachment including removal of the silicon oil with repeat vitrectomy with membrane peel and tamponade with either gas or reinjection of silicon oil, repeat vitrectomy without the removal of silicon oil.

Interface vitrectomy is a technique described for operating at the interface between vitreoretinal tissue and substances immiscible in aqueous medium.³ Silicon oil interface vitrectomy is used for operating cases of recurrent retinal detachment with proliferative vitreoretinopathy with epimacular membrane. These patients typically develop an inferior recurrent retinal detachment due to inadequate tamponade by silicon oil inferiorly or an open break inferior retinal detachment.⁴

MATERIALS AND METHODS

15 cases of recurrent retinal detachment managed with the technique of interface vitrectomy done over 6 months were reviewed. Following data was recorded for each patient: age, gender, characteristic of the recurrent retinal detachment, pre-operative and post-operative visual acuity, intraoperative and post-operative complications if any.

All the surgeries were performed by one surgeon (Dr. AD). All the patients underwent a two port procedure. Epimacular membrane was peeled using forceps tangentially or in postero-anterior direction. Then any peripheral membranes were removed.

After all the traction has been removed, endodrainage of the subretinal fluid was done using flute needle with passive egress of the subretinal fluid with pressure on the globe using scleral depressor. This drainage was done either from a preexisting retinal break or a retinotomy.

If after removal of the subretinal fluid the retina still didn’t fall back, due to the process of retinal shrinkage, a relaxing retinotomy was made.
After all the traction had been sufficiently removed, additional silicon oil was injected as top up through one of the pars plana ports, for additional tamponade, and this was followed by barrage laser.

Original method of doing this procedure is to make 3 pars plana ports and in one of the ports silicon oil infusion can be attached and infused as the procedure is being carried out but it gets messy due to leaking of silicon oil.

This infusion creates the positive pressure for the drainage of subretinal fluid and also gives sufficient tamponade for reattachment of the detached retina.

The authors recommend the modified procedure, as the visibility in the original method is often compromised due to silicon oil in the operating field.

**RESULTS**

It was noted that there was significant improvement in the post-operative vision of the operated patients.

A particular set of complications were noted in some patients, which included:

- Pre retinal hemorrhage – seen in 2 patients
- Vitreous hemorrhage – seen in 1 patient
- Hypotony – seen in 2 patients
- Subretinal Silicon oil – seen in 2 patients due to persistent traction

But in spite of all these complications all patients finally recovered with good post-operative vision with macula attached, few had inferiorly located retinal detachment for which barrage laser was done.

**DISCUSSION**

This is a simple fast procedure in recurrent retinal detachment cases where membranes are visible and matured.

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**Table 1: Visual Improvement after Surgery**

<table>
<thead>
<tr>
<th>Pre-op</th>
<th>Post-op</th>
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<tbody>
<tr>
<td>PL* (7)</td>
<td>FC 2 m (2)</td>
</tr>
<tr>
<td></td>
<td>FC 1 m (5)</td>
</tr>
<tr>
<td>HM** (4)</td>
<td>FC 1 m (2)</td>
</tr>
<tr>
<td></td>
<td>FC 2 m (2)</td>
</tr>
<tr>
<td>FCCF ***(4)</td>
<td>6/60 (3)</td>
</tr>
<tr>
<td></td>
<td>FC 2m (2)</td>
</tr>
</tbody>
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*PL–Light perception, **HM–Hand Movements ***FCCF–Finger counting close to face*
The assistant can visualize the subretinal fluid egressing from the flute needle port and also in cases of incomplete silicon oil fill the fluid overlying the disc can be easily aspirated.

The action of scleral depression increases the intraocular pressure and causes fluid to egress passively from the flute needle over the break. Silicon oil can sometimes clog the flute needle which needs to be flushed. 23G trochar cannula can be used to make this a suture less surgery. But 20G is also very effective using a snip conjunctival incision wherein the surgery is easy as the fluid can egress more freely due to a large bore.

Hypotony induced can be overcome by the scleral depression, and top up of silicon oil can be done using an automated injector or manually.

The average time of the procedure is about 10-15 minutes.

Endolaser is performed as a barrage inferiorly and around the break.

The advantages of operating under silicon oil are:

- Fast procedure
- Cost Effective
- 2 port procedure
- Gratifying results are obtained.

The Disadvantages of this technique are:

- Complications such as bleeding can occur while peeling of membranes
- Hypotony
- Subretinal Silicon oil in case traction is not removed properly

**CONCLUSION**

The technique of silicon oil interface vitrectomy is very effective procedure in patients with recurrent retinal detachment with PVR and gives very gratifying results.

**REFERENCES**


Intravitreal Dexamethasone Implant for Refractory Macular Edema (ME) of Various Etiologies

Dr. Neeraj Sanduja, Dr. Anisha Seth, Dr. Ajay Aurora

Macular edema can occur in various etiologies like Diabetic retinopathy, vascular occlusion and uveitis and is the most important cause of vision loss. It also needs early intervention and treatment as the longer the fluid remains at the fovea, the more photoreceptor damage it causes. As a result, there is poor vision gain even after resolution of edema. The first line of treatment of macular edema depends upon the etiology.

Diabetic retinopathy represents the leading cause of blindness among adults of working age in the developed world. Diabetes-related central vision loss can arise either from microvascular occlusion (macular ischemia) or from microvascular leakage due to breakdown of the inner blood-retinal barrier (BRB), leading to macular edema (DME). DME displays features characteristic of a chronic, low-grade, local inflammatory response. Vitreous fluid from patients with DME shows evidence of active inflammation, containing elevated levels of pro-inflammatory cytokines. Although laser is still considered the gold standard for DME, intravitreal pharmacotherapy in the form of intravitreal Anti-VEGF agents and steroids are also slowly becoming the mainstay of treatment.

Similarly, retinal vascular occlusions (RVO) also lead to macular edema due to the release of pro-inflammatory mediators and breakdown of BRB. Although many cases of ME in RVO resolve on their own, it doesn’t not lead to a good visual outcome. Hence, intravitreal Anti-VeGF agents and steroids are now being used to treat ME in RVO.

Uveitis belongs to a group of intraocular inflammatory disorders affecting the uvea, which can cause significant visual impairment and may result in partial or complete loss of vision. Intermediate uveitis and posterior uveitis affect the posterior segment of the eye and are often unresponsive to topical administration of steroids due to less than optimum therapeutic drug penetration beyond the lens. They cause vision loss by causing cystoid macular edema, epiretinal membrane, retinal detachment, subretinal fibrosis or optic nerve damage. Periocular and subtenon steroids could be effective in treating some patients with uveitis associated cystoid macular edema (CME) but their successful use has been limited to mild cases due to poor absorption of the drug when delivered through this route. Long-term systemic corticosteroid therapy is also effective, but is associated with a variety of potentially serious adverse
effects such as induction or worsening of hypertension and diabetes mellitus, osteoporosis, and adrenal suppression.\textsuperscript{5}

Intravitreal steroids, thus form an important part of treatment of macular edema as the release of inflammatory mediators occurs in all etiologies. Intravitreal triamcinolone acetonide (IVTA) at a concentration of 2-4mg in 0.1ml is the most common form, used for the treatment of macular edema of all etiologies because of its easy availability and cost-effectiveness. However, its significant drawbacks include the risk of glaucoma, cataract and endophthalmitis.

Due to these risks, its use has been limited to cases which do not respond to Anti-VEGF agents in DME and RVO; and Posterior subtenon triamcinolone and systemic steroids in uveitis. Ozurdex (Allergan Pharmaceuticals) is a biodegradable dexamethasone intravitreal implant that contains 0.7mg of dexamethasone. It received FDA approval in 2009 for treatment of ME in RVO, in 2010 for the treatment of non-infectious posterior uveitis, and recently in 2014 for the treatment of DME. We conducted this study to know the efficacy of intravitreal dexamethasone implant in refractory ME of various etiologies.

**MATERIALS AND METHODS**

This was a prospective interventional case series that included 5 eyes with refractory macular edema due to various etiologies not responding to conventional treatment. The series included 2 eyes with DME and 2 eyes with ME due to BRVO and one eye with uveitic macular edema with epiretinal membrane.

All the four eyes with DME and ME due to BRVO had received 3 injections each of intravitreal bevacizumab and intravitreal ranibizumab, but did not show any decrease in ME or improvement in vision. The eye with uveitic ME had received oral corticosteroids for 3 months, a single posterior subtenon triamcinolone injection and finally underwent cataract surgery with intraocular lens implantation with pars plana vitrectomy with epiretinal membrane peeling with 14% SF6 injection and prone position, but did not show any change in ME.

A complete ocular evaluation, including measurement of best corrected visual acuity (BCVA) with the Snellen chart, slit-lamp biomicroscopy, IOP (intraocular pressure) using Applanation tonometry, fundus photography, fundus fluorescein angiography FFA and spectral-domain optical coherence tomography OCT (RTvue, Optovue, Inc., CA) were performed at baseline.

All 5 eyes were given intravitreal dexamethasone implant 0.7 mg under aseptic conditions as an outpatient procedure. All patients were examined next day for evaluation of visual acuity, IOP and evidence of any intraocular
inflammation/infection and any other complication. Topical antibiotics were prescribed for 1 week.

Subjects were followed up monthly for 4 months for BCVA, IOP, slit lamp examination for lens status assessment and fundus examination. Fundus photography and OCT were done at 1 months and 4 months.
Main outcome measures were change in BCVA and Central macular thickness (CMT). Statistical analysis was done using SPSS (IBM SPSS version 22). Wilcoxon signed rank test was used for pre and post-treatment comparison. A p-value ≤ 0.05 was considered statistically significant.

**RESULTS**

The mean age of patients was 54.2 ± 7.66 years. 66.7% patients were males while 33.3% were females. The mean baseline BCVA was 0.126 ± 0.11 that improved to 0.302 ± 0.14 in 1 month and to 0.336 ± 0.17 at 4 months (p=0.01).

The mean CMT pre-injection was 596.6 ± 126.12 microns that decreased to 316.4 ± 153.8 microns at 1 month and to 321.6 ± 243.07 microns at 4 months (p=0.005). Out of the 5 eyes, 4 eyes showed complete resolution of ME at the end of 4 months. One eye with ischemic BRVO and CMT of 809 microns showed an initial decrease in edema at 1 month, but it recurred at 3 months.

The mean baseline IOP was 17.12 ± 0.8 mm of Hg while at 4 months, it was 17.5 ± 0.9 mm of Hg (p=0.197). None of the eyes showed a rise in IOP > 21 mm of Hg during the follow up period. None of the 5 phakic patients had cataract progression.

**DISCUSSION**

Ozurdex® is placed intravitreally through the pars plana with an injector using a 22-gauge needle device. The insert provides peak doses for an initial 2 months followed by lower doses for up to 6 months and can be safely performed as an outpatient procedure. The clinical efficacy of Ozurdex® in the treatment of macular edema due to non-infectious posterior uveitis, RVO and Diabetic retinopathy has already been assessed and established in various large studies.\(^5,6,7\)

In our study it was seen that after Ozurdex implant, there was significant reduction in central macular thickness compared to baseline levels at month 1 in all eyes. In one of the eyes, the maximum reduction in macular thickness was seen at month 1 followed by re-appearance of macular edema clinically significant macular edema at month 4. This showed that the peak effect of the drug was in between 1 and 4 months. This is similar to the results seen in previous studies.\(^8\)

Rise in intraocular pressure is a known side effect after intraocular corticosteroids injections. In our study, none of the 5 eyes had a rise of intraocular pressure. Studies have shown that percentage of eyes receiving triamcinolone (4 mg) have higher risks of IOP elevation more than or equal to 10 mm Hg (8.9%) compared to sustained release of dexamethasone (0.9%) in patients with macular edema secondary to RVO over the course of 12 months.\(^9\) Also, none of the eyes had significant cataract progression.
which could have caused significant reduction in visual acuity at 4 months compared to baseline level. In one of the studies n patients with macular edema secondary to RVO who received Ozurdex injection, only 1.3% of phakic eyes underwent cataract surgery over the course of 12 months.\(^6\)

Hence, intravitreal dexamethasone implant is an efficacious and safe treatment option in refractory macular edema of various etiologies, that does not respond to conventional treatment. However, larger study groups of different disease etiologies, with longer follow up are required for a better understanding.

REFERENCES

Analyzing Outcome of Silicone Oil Removal After Vitreoretinal Surgeries for Various Indications

Dr. Jayshree Arunaprakash, Sahoo Priyadarshini Pitabas, Dr. Jay Shah

The use of silicone oil tamponade was first described by Cibis et. al. in 1962, and modified by Scott and Zivojnovic. Since then, silicone oil injection has become an integral part of vitrectomy in the treatment of complex retinal detachments. If left for a long time, silicone oil can cause cataract, glaucoma and keratopathy. However silicone oil removal is also associated with risk of retinal re-detachment.

The aim of this retrospective study was to assess the anatomical and functional outcome after removal of silicone oil tamponade for complicated retinal detachments.

MATERIALS AND METHODS

We reviewed the case records of all patients who underwent vitrectomy with silicone oil injection at our centre between January 2013 to December 2014. This series included 39 eyes of 39 patients of which 22 were males (56.4%) and 17 were females (43.6%). The average age of the patient at the time of surgery was 59 years, with the range of 22 and 70 years. All surgeries were performed by one surgeon (JS).

The indications for use of silicone oil tamponade were complex retinal detachments with proliferative vitreoretinopathy (35 eyes, 89.74%), proliferative diabetic retinopathy (3 eyes, 7.7%) and combined retinal detachment (1 eye, 2.56%). The PVR grading of the rhegmatogenous detachment cases was done according to the Silicone study group classification.

All patients underwent standard 3 port pars plana vitrectomy with membrane peeling, argon laser endophotocoagulation, fluid-air exchange and intraocular silicone oil injection. Some cases require perfluorocarbon liquids for assisting membrane peeling. All the eyes were filled with silicone oil with a viscosity of 1500 centistokes. The duration of silicone oil tamponade ranged from 2.5 to 10.5 months with a mean of 5 months.

The oil was removed after making 2 sclerotomies under binocular ophthalmoscope. The inferotemporal port was used for infusion and silicone oil was removed through the superotemporal port using active suction. Additional procedures like ERM peeling were done in 2 patients (5.13%).
All patients underwent complete ocular examination before silicone oil removal and at 1 week post-op, 1 month post-op and at each subsequent visit. The examination included visual acuity testing using Snellen chart, measurement of intraocular pressure using Goldmann Applanation tonometer, slit lamp biomicroscopy and fundus examination with 90 D and indirect ophthalmoscopy.

The mean postoperative follow up was 14 months, ranging from 6 to 18 months.

**RESULTS**

Anatomic success after Silicone Oil removal was defined as complete attachment of the retina for a minimum of 6 months. This was seen in 38 eyes (97.44%). Retinal redetachment was seen at 1 month for silicone oil removal in 1 patient who had undergone surgery for Retinal Detachment with giant retinal tear.

The mean uncorrected visual acuity was 6/60 (logmar 1) before SOR and post-SOR it was 6/18 (logmar 0.48) at 1 month post-op and 6/12 (logmar 0.3) at 3 and 6 months post-op (p<0.05 by paired t-test). The mean best corrected visual acuity was 6/18 before SOR and 6/12 post SOR (3 months and 6 months). (p>0.05).

The best corrected visual acuity remained unchanged in 11 (28.2%) eyes, improved in 12 eyes (30.77%) and worsened in 16 eyes (41.03%) at the end of 1 month post SOR. The visual loss was related to development of cataract in 10 patients (62.5%), redetachment in 1 patient (6.25%), vitreous haemorrhage in 2 patients (12.5%) and unexplained in 3 patients (18.75%).

At the end of 6 months post SOR, all patients with vitreous hemorrhage improved and patients with cataract had undergone Intraocular Lens implantation. Hence at the end of 6 months post SOR, the BCVA remained unchanged in 20 patients(51.28%), improved in 15 patients (38.46%) and worsened in 4 patients (10.26%). During silicone oil tamponade, elevated IOP (>21 mm Hg) occurred in 16 patients and these patients were treated with topical antiglaucoma medications.

Of these, the IOP in 15 patients normalized after SOR and the topical antiglaucoma medications were stopped in these patients. One patient was successfully treated with topical antiglaucoma medications. One patient developed hypotony (<8 mm Hg) post SOR but the IOP returned to normal at 1 week. None of the patients developed Keratopathy, Optic Atrophy or Phthisis bulbi post SOR.
DISCUSSION

The commonest reported complication after silicone oil removal is redetachments and the reported incidence varies between 0% to 32%. In our series, only one patient developed redetachment after silicone oil removal. However no conclusion can be drawn from the low rate of redetachment in our group because of the small number of cases.

In our series, the commonest complication of silicone oil tamponade was raised IOP, which normalized following removal of silicone oil.

CONCLUSION

In our series, the redetachment rate is relatively low. Raised IOP is the most common complication following silicone oil tamponade, which is reversible. Long term significant improvement was noted in uncorrected visual acuity and best corrected visual acuity was maintained well in most of the patients. However the major drawbacks of our study are the small number and retrospective nature of the study.

REFERENCES

Long Term Results of Surgical Management of Macular Detachment (MD)

Dr. Rachana A Dabhade, Dr. Chandra Kumar H V, Dr. Sri Ganesh, Dr. Krishna Nagaradh

Macular detachment (MD) is defined as detachment involving the fovea with any resulting loss of central Snellen visual acuity.

In eyes with macula-off retinal detachment (RD), degeneration of the photoreceptors in the detached area of the macula often prevents complete recovery of visual function and leads to central visual dysfunction, even after successful reattachment. The most important predictor of visual recovery after retinal detachment surgery is preoperative visual acuity.

In 1998, Kusaka et. al. published an article in the Japanese literature on long-term visual recovery. They retrospectively investigated the long-term visual recovery in 32 macula-off retinal detachments that had been followed up for more than 5 years after surgery. They found that the best corrected visual acuities were better at 5 years than at 3 months by two lines or more in 17 eyes (53%). An initial 93–96% anatomic success rate can be expected whether the patient is phakic or pseudophakic. Similar studies have been done to predict the surgical outcome.

Although remarkable progress has been achieved in the surgical treatment of eyes; Retinal detachment (RD), it is still difficult to predict postoperative visual outcomes in macula-off RD.

Aim of this study is:

• To prognosticate Macular Detachment (MD) surgeries.

• We have cluster of parameters that could provide a suitable evaluation and then determined the relationship between these parameters and postoperative visual outcomes in macula-off RD eye.

MATERIALS AND METHODS

• Included in the study were patients of 18 years and older.

• All eyes underwent standard 3-port pars plana vitrectomy using 20-gauge (20G) or 23 gauge (23G) instrumentation with a bimanual technique and using Binocular Indirect Operating Microscope system (BIOM).

• Retrospective, consecutive case series of 86 patients who underwent parsplana vitrectomy(PPV).

• Primary outcome measures as best corrected visual acuity (BCVA) and
rates of retinal anatomical attachment.

- Secondary outcome in terms of resurgeries or any complications.

**Exclusion Criteria**

1. Combined Retinal detachment.
2. Bullous Retinal detachment.

**DISCUSSION**

Surgery technique wise

- When comparing laser versus cryotherapy, laser retinopexy had a higher single procedure reattachment rate and better final visual acuity compared to cryotherapy.
- No significant difference in 20G and 23G PPV surgical outcome.
- Most ERM recurrences that occurred in patients who had undergone ILM peeling were thin and asymptomatic.

**Vision**

- Preoperative VA in two groups A and B, A from >20/200 and B as <20/200 in eyes.
- There was a strong positive correlation between good preoperative and postoperative VA Eyes with a preoperative visual acuity of 20/200 or better had a mean postoperative vision of better than 20/60.

**Table 1: Observation**

<table>
<thead>
<tr>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
<th>Group 4</th>
<th>Group 5</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>RRD</td>
<td>TRD</td>
<td>VTMS</td>
<td>MH</td>
<td>Myopic</td>
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<tr>
<td>32</td>
<td>6</td>
<td>21</td>
<td>18</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Mean Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>35</td>
<td>56</td>
<td>58</td>
<td>60</td>
<td>65</td>
<td>54.8</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Predominance</td>
<td>M</td>
<td>F</td>
<td>F</td>
<td>M</td>
<td>M&gt;F</td>
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<tr>
<td>Success Rate (Anatomical Attachment)</td>
<td>96.8</td>
<td>88.3</td>
<td>100</td>
<td>100</td>
<td>100</td>
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<tr>
<td>Preop BCVA Mean (Logmar)</td>
<td>1.3</td>
<td>1.2</td>
<td>1.3</td>
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<td>1.4</td>
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<tr>
<td>Postop BCVA (Logmar) Mean</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Month</td>
<td>1.2</td>
<td>1.3</td>
<td>1.1</td>
<td>0.4</td>
<td>1.0</td>
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<tr>
<td>3 Month</td>
<td>1.2</td>
<td>1.4</td>
<td>1.0</td>
<td>0.3</td>
<td>1.0</td>
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<tr>
<td>12 Month</td>
<td>0.6</td>
<td>1.2</td>
<td>0.5</td>
<td>0.3</td>
<td>0.8</td>
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### Table 2

<table>
<thead>
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<th>Parameters</th>
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<tbody>
<tr>
<td>Mean follow up</td>
<td>10.8 months</td>
</tr>
<tr>
<td>Surgery within one week of presentation</td>
<td>35</td>
</tr>
<tr>
<td>Surgery more than one week of presentation</td>
<td>51</td>
</tr>
<tr>
<td>Aphakia</td>
<td>03</td>
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<tr>
<td>Pseudophakia</td>
<td>15</td>
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<tr>
<td>Cataract</td>
<td>20</td>
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<tr>
<td>Clear lens</td>
<td>48</td>
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### Table 3

<table>
<thead>
<tr>
<th>Surgical Technique</th>
<th>N</th>
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<tr>
<td>20 G</td>
<td>45</td>
</tr>
<tr>
<td>23G</td>
<td>41</td>
</tr>
<tr>
<td>Endolaser</td>
<td>48</td>
</tr>
<tr>
<td>Cryotherapy</td>
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<tr>
<td>Combined Cataract Surgery</td>
<td>18</td>
</tr>
<tr>
<td>Ilm Peeling</td>
<td>36</td>
</tr>
<tr>
<td>Gas Tamponade</td>
<td>33</td>
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<tr>
<td>Silicone Oil Tamponade</td>
<td>43</td>
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### Table 4: Postoperative Complication

<table>
<thead>
<tr>
<th>Resurgery</th>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
<th>Group 4</th>
<th>Group 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>1</td>
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</table>

### Table 5

<table>
<thead>
<tr>
<th>Number Of Patients</th>
<th>%</th>
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<tbody>
<tr>
<td>PVRI</td>
<td>7</td>
</tr>
<tr>
<td>Secondary Glaucoma</td>
<td>17</td>
</tr>
<tr>
<td>All Controlled On Medical Treatment.</td>
<td>5</td>
</tr>
<tr>
<td>Cataract</td>
<td>3</td>
</tr>
</tbody>
</table>

**Post-operative Vision**

Overall, 65.9% of the patients reached visual acuity at the final exam of 0.48 logMAR compared with a preoperative mean acuity of 1.24 logMAR.

**Time**

- Time: from onset of symptoms to Surgery was less than 1 week for 55 eyes (63.9%) and more than 1 week for 31 eyes (36.0%).
Early the evaluation and surgery, better the postoperative result.

- Lens status

- In phakic patients, the primary success rate was 95.8%, whereas in pseudophakic patients, primary success rate of 93.3% was observed.

- The pars plana vitrectomy was combined with cataract surgery and intraocular lens implantation in 18 eyes (20.9%).

- 93% of this Group had BCVA < 20/60 by 12th month.

**CONCLUSION**

- Despite different etiologies for MD this case series show common favouring prognostic factors like earliest timing of surgery, good baseline BCVA. Better results with gas use over silicone oil, combined cataract surgery, ILM peeling over ILM preserved cases.

- The strongest predictor of BCVA at all post-operative intervals was presenting BCVA.

- PVR grade being the most important negative factor for redetachment.

- Due to the unequal distribution of cases using laser retinopexy versus cryotherapy after pneumatic retinopexy, larger prospective studies are needed to further elucidate the clinical outcomes of these procedures.

**REFERENCES**


2. Wakabayashi T., Oshima Y., Fujimoto H., Murakami Y., Sakaguchi H., Kusaka S., Tano Y. Foveal microstructure and visual acuity after retinal detachment

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**Table 6: Surgery Success Rate**

<table>
<thead>
<tr>
<th>Type Of Surgery</th>
<th>N</th>
<th>Primary Attachment Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ppv+Erm Removal+Gas</td>
<td>11</td>
<td>90.9</td>
</tr>
<tr>
<td>2. Ppv+Erm Removal+Silicone Oil</td>
<td>12</td>
<td>91.7</td>
</tr>
<tr>
<td>3. Ppv+Ilm Peeling+Gas</td>
<td>14</td>
<td>92.8</td>
</tr>
<tr>
<td>4. Ppv+Ilm Peeling+Silicone Oil</td>
<td>06</td>
<td>100</td>
</tr>
<tr>
<td>5. Ppv+Cryo+Silicone Oil</td>
<td>12</td>
<td>91.7</td>
</tr>
<tr>
<td>6. Ppv+Cryo+Gas</td>
<td>8</td>
<td>100</td>
</tr>
<tr>
<td>7. Ppv +Endolaser+Silicone Oil</td>
<td>31</td>
<td>100</td>
</tr>
<tr>
<td>8. Ppv +Endolaser+Gas</td>
<td>17</td>
<td>100</td>
</tr>
<tr>
<td>9. Ppv+Pfc1 Use+Endolaser</td>
<td>15</td>
<td>93.3</td>
</tr>
<tr>
<td>10. Ppv+Sb+Endolaser</td>
<td>6</td>
<td>100</td>
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</table>


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**30-Gauge Pars-Plana Surgery in Recurrent Vitreous Hemorrhage**

**Dr. Satyen Deka**

Current microincision vitrectomy surgery (MIVS) with 25- or 23-gauge instrumentation has simplified the vitrectomy procedure and offers numerous potential advantages over traditional 20-gauge surgery including shorter operating time, reduced corneal astigmatism, diminished conjunctival scarring, less postoperative inflammation, improved patient comfort, and, in some cases, earlier visual recovery.1-6 Are current procedures, however, really the simplest and most minimally invasive? Currently, complex techniques are required for self-sealing 23- and 25-gauge wounds.2,7,8 Additionally, reports of wound-sealing-related complications, such as hypotony and endophthalmitis, have surfaced as a result of increasing use of MIVS with 23- and 25-gauge instrumentation.9-11 Prior to the introduction of MIVS, smaller-gauge instruments have been used for postoperative management of vitrectomized eyes. For example,
we have performed transconjunctival fluid-fluid exchange and fluid air exchange through a 27-gauge needle for many years, and there are no reports of serious complications related to wound integrity with a 27-gauge needle. The present study aimed at evaluating the efficacy and safety of 30-gauge pars-plana surgery in recurrent vitreous hemorrhage.

MATERIALS AND METHODS
In this pilot study seven eyes of six consecutive patients underwent 30-gauge two port vitreous surgery under topical anesthesia. After achieving maximum pupillary dilatation with 1% tropicamide and 5% phenylephrine, the conjunctival cul-de-sac was first anesthetized with a drop of 0.5% propacaine hydrochloride (Paracain 0.5% eye drops). The eye and the surrounding area were then cleaned and painted with povidone iodine 5%. After draping the eye was kept open using the universal speculum. Pledger soaked in 0.5% proparacaine hydrochloride anesthetic drop is placed at proposed 2 sclerotomy sites for one minute just before entry (Figure 1).

In this innovative 2 port technique, intraocular infusion is done through a 30-gauge needle. The VGFI system in ACCURUS, Alcon machine was adjusted at 120mm of Hg and the infusion is connected to the 30 –gauge needle. Further raising the bottle height of infusion fluid sufficient flow was maintained. Another 30 gauge needle was connected to the Silicone oil removal tubing and the device was connected to the vitrectomy machine with the vacuum setting at 600 mm of Hg. Using the foot pedal continuous suction done till clear fluid appear in the SOR device. Then the intraocular infusion flow decreased reducing the bottle height and the VGFI setting was kept at 60 mm of Hg. The 30 gauge needle holding the SOR device is removed first and then the needle with infusion was removed. Indirect ophthalmoscopy examination done at the end of surgery. A drop of povidone iodine drop (1%) instilled into the cul-de-sac at the end of the surgery. All patients were started on combination of topical steroid and antibiotic eye drops every 6 hours for 7 days postoperative period. The patients were evaluated next day, at one week and at one month.

RESULTS
All seven patients (100%) had successful removal of recurrent vitreous hemorrhage and no eyes required conversion to larger-gauge instrumentation during surgery. There were no intraoperative complications and all eyes (100%) had minimal postoperative inflammation. The mean operating time in the study was 15 minutes. Fundus view were absent in two eyes on first postoperative day which improved in subsequent follow ups in one eye whereas the other eye required further intervention to remove the recurrent vitreous hemorrhage. Improvement in visual acuity noted in cases where
vitreous cavity was clear. None of the patients required oral analgesics in the postoperative period. The operated eyes were quiet at 1 week and subsequent follow ups.

**DISCUSSION**

The 30-gauge system offers several advantages over the currently widely used 23- and 25-gauge systems. Using the 30-gauge system removes concerns about complications related to wound sealing. Complex techniques for creating a self-sealing wound, such as angled-insertion technique\(^7\) or two-step entry method, \(^2\) are no longer required. The 30-gauge surgery can begin immediately after entering at the pars plana by simple vertical insertion using the 30-gauge needle. No trocar-cannula system is required.

After simple removal of the needles, surgery is closed at once and all sclerotomies self-sealed completely without the need for suturing. Using the 30-gauge system, opening and closing procedures can be simplified, and this may contribute to saving total operating time with this system. In our series, the IOP of all 7 eyes were stable on postoperative day 1 without any eyes encountering hypotony (≤7 mm Hg) suggesting perfect self-sealing structures of the 30-gauge wounds. The 30-gauge sclerotomy can no longer be identified even on postoperative day 1, and there are no remarkable changes on the ocular surface in most cases (Figure 4).

The shorter operating time in the study (mean 15 min) attributed to the minimally invasive nature of the surgery. No eyes required conversion to larger-gauge instrumentation during surgery. No serious intraoperative complications noted and during follow up except recurrent vitreous hemorrhage no other post operative complication occurred. Intraoperative anatomic success was achieved in all study eyes, including visual improvement in eyes without recurrent hemorrhage in follow-up examinations.

A crucial concern of 30-gauge surgery was infusion flow. Because of the small caliber of the 30-gauge needle, the infusion flow remains very less. This obstacle was overcome by using the VGFI system where setting the infusion pressure at 120 mm of Hg, along with raising the maximum bottle height intraocular infusion can be maintained even with 30 gauge system. Again, by using the SOR device with high vacuum of 600 mm of Hg the recurrent vitreous hemorrhage can be comfortably sucked out. This procedure is done using two sclerotomies.

The important advantage of 30-g surgery is that, the surgery can be done under topical anesthesia.

The disadvantage is that, the surgeon has to use both the hands to hold the 30 gauge needles during the whole procedure.
CONCLUSION

30-gauge surgery under topical anesthesia is safe and effective in recurrent vitreous haemorrhage. Further larger prospective, comparative studies with longer follow up is required to validate the outcome of this study.

REFERENCES

Correlation of Hba1c, Renal and Lipid Profile with Macular Thickness Parameters on SD-OCT

Dr. Sandeep Saxena, Dr. Ankita, Dr. Sandeep Saxena

Diabetic retinopathy (DR) is a microvascular complication of diabetes mellitus (DM) and is a leading cause of morbidity in people with DM. The prevalence of DR is 18% in urban population older than 40 years with DM. Although the pathogenesis of DR is not completely understood, several risk factors have been established. These include poor glycemic control, hypertension, increasing age, dyslipidemia, serum urea, serum creatinine and duration of DM.

Nephropathy and retinopathy are associated together and renal function status can be anticipated and prognosis explained on the basis of retinal examination. The association has a chronological aspect implying that renal injury occurs prior to retinal damage.

Lipoproteins play an indirect role in DR by affecting the integrity of the blood retina barrier (BRB). In retina with an intact BRB, plasma lipoproteins may be largely irrelevant but when BRB is impaired in diabetes, it leads to lipoprotein extravasation and subsequent modification, hence causes toxicity to the neighbouring retinal cells. The external limiting membrane (ELM) is a part of the retinal barrier that is disrupted by pathological conditions contributing to fluid accumulation in the macula, hence affecting the macular thickness.

It has also been found that high low density lipoprotein (LDL) was found to be associated with increased central subfield macular thickness (CSMT) and central subfield macular volume (CSMV) in diabetic patients without DME.

Fovea is the central region of retina with highest visual acuity. Optical coherence tomography (OCT) is a reliable technology to map in vivo retinal histology.

MATERIALS AND METHODS

The study was conducted according to the tenets of the Declaration of Helsinki after approval from the institutional review board. An informed voluntary consent was obtained from all the study subjects. This was a tertiary care centre based cross sectional study. One hundred sixty consecutive cases of type 2 DM and forty healthy controls, between age group 40-60 years, were included. Based on the fundus photography and fluorescein angiography, cases were divided into three groups: patients of diabetes without retinopathy (No DR) (n=40), non-proliferative diabetic retinopathy (NPDR) (n=40) and proliferative diabetic retinopathy (PDR) (n=40) according to the ETDRS classification. Cases with ocular or systemic
diseases affecting the retinal vascular pathology, end stage renal disease, cases with history of any previous intravitreal injection(s), ophthalmic surgical or laser interventions and cases with media haze at any level giving signal strength of less than 5 on OCT were excluded. Cases on lipid lowering medications, dialysis, and those suffering from chronic kidney disease, end stage renal disease or atherosclerosis were also excluded. Best corrected visual acuity (BCVA) was documented on logMAR scale. All the study subjects underwent detailed fundus evaluation using stereoscopic slit lamp biomicroscopy and indirect ophthalmoscopy. Digital fundus photography and fluorescein angiography was done using Zeiss fundus camera FF 450 Plus with pixel width of 0.0054 and image size 2588x1958.

All study subjects underwent macular thickness analysis using three dimensional spectral domain optical coherence tomography (SD-OCT) (Carl Zeiss MeditecInc., CA, U.S.A). Macular cube analysis 512x128 protocol was used (Figure 1). Blood samples were collected from all the study subjects by aseptic venepuncture.

Serum urea was measured by kinetic enzymatic method with urease and glutamate dehydrogenase. Serum creatinine was measured by modified Jaffe’s method without deproteinisation. Total cholesterol (CHO) and triglycerides (TGs) were measured by enzymatic method. High density lipoprotein (HDL) was analysed using phosphate tungsten method. All tests were performed using standard protocol. Very low density lipoprotein (VLDL) and LDL were calculated using the above values \[VLDL=\frac{TG}{5}, \quad LDL= (VLDL+HDL) - \text{cholesterol}\].

Data has been summarized as Mean ± SE. The continuous variables of the study groups were compared by one factor analysis of variance (ANOVA). The discrete (categorical) variables were compared by chi-square (χ2) test. For pair wise comparison between the groups, Tukey’s test for multiple comparison was used. Pearson correlation analysis was used to assess association between the variables. A \(p<0.05\) was considered statistically significant. All analyses were performed STATISTICA 6.0 software package (StatSoft, 2001).

RESULTS

Mean age (in years) of the four groups was 53.7 ± 8.05 in controls, 54.01 ± 6.04 in No DR, 57.7 ± 4.63 in NPDR and 55.5 ± 8.15 in PDR groups. No significant difference in the age was observed among the groups (\(F=2.47, p=0.06\)).

The χ2 test revealed similar (\(p>0.05\)) sex proportion among all the four groups (Male/Female: 6/14 vs. 13/7 vs. 14/6 vs. 15/5, \(\chi^2=7.1\ p=0.08\)).

Mean duration of diabetes mellitus in years was 7.16 ± 5.20 in No DR, 10.37 ± 5.90 in NPDR and 12.18 ± 4.67 PDR groups. Significant association of
severity of diabetic retinopathy with increase in the duration of the disease was documented (F=17.62, p<0.01).

Mean glycated hemoglobin (%) was 6.2±1.23, 6.35 ± 0.60, 7.29 ± 1.49 and 8.70 ± 1.90 in controls, NODR, NPDR and PDR respectively. Significant difference was found between glycated hemoglobin among the groups on analysis of variance (ANOVA).

Mean logMAR BCVA was 0.04 ± 0.08 in control, 0.3 ± 0.37 in No DR, 0.5 ± 0.37 in NPDR and 1.4±0.41 in PDR groups. On ANOVA, significant difference in visual acuity was found among the group (F=42.69, p<0.01). Decrease in BCVA was significantly associated with increase in CST (r=0.28, p=0.04) and CAT (r=0.26, p=0.01).

Table 1 summarizes the central subfield thickness (CST) and cube average thickness (CAT) in study group.

Mean values of the serum levels of CHO, HDL, LDL, VLDL, urea and creatinine has been shown in Table 2. On ANOVA, difference in serum CHO (F=6.61, p<0.01), serum HDL (F=4.43, p<0.01), serum LDL (F=6.27, p<0.01), serum VLDL (F=6.17, p<0.01) was found different between the study groups.

Table 3 shows correlations between various biochemical parameters with CAT, CST and BCVA. On Pearson’s correlation analysis, increase in serum urea was correlated with increased CST (r=0.10, p=0.57). CST was not significantly correlated with serum CHO (r=0.17, p=0.13), HDL (r=-0.12, p=0.29), LDL (p=0.19, p=0.09) and VLDL (r=0.63, p=0.58). CAT was found to be correlated with CHO (r=0.40, p=0.00), HDL (r=0.42, p=0.71), LDL (p=0.34, p=0.02) and VLDL (r=0.15, p=0.16). Increased logMAR BCVA was significantly associated with increased serum cholesterol (p=0.01) and decreased HDL (p=0.01). There was no significant association between BCVA with LDL (r=0.31, p=0.06) and VLDL (r=0.04, p=0.72).

**DISCUSSION**

Our present study established a correlation of altered serum urea, CHO ,LDL and HDL with CAT and CST and BCVA. It was found that increased serum urea is significantly correlated with increased CST. Increased serum CHO and LDL is significantly correlated with increased CAT. Decreased BCVA is significantly correlated with increased serum CHO, LDL and decreased serum HDL. It also shows that increased CST and increased CAT are positively correlated with decreased BCVA.

Severity of diabetic retinopathy was found to be significantly associated with duration of disease in accordance with a study by Cornea et. al. Intensive glycemic control can substantially reduce the onset and progression of DR. Diabetic nephropathy is also an important modifiable risk factor in diabetic
macular edema (DME). Renal-retinal syndrome refers to concurrent renal and retinal disease due to diabetic microangiopathy of retinal and glomerular vessels. In a recent study the level of renal impairment was found to be proportional to the level of damage to retina. The results of our study are consistent with another study which demonstrated decrease in foveal thickness after hemodialysis in patients with diabetic maculopathy. This suggests role of deranged serum urea and creatinine in development of DME.

Various studies have found decreased visual acuity to be significantly associated with increase in grade of ELM and inner segment outer segment junction disruption seen with increase in severity of diabetic retinopathy. Our previous studies involving nitric oxide, oxidative stress, advanced glycation end products, VEGF and ICAM in DR have been associated with in vivo structural changes in inner segment ellipsoid and retinal pigment epithelium. Another recent study of ours has found a significant association between increase in central subfield thickness and grade of photoreceptor ellipsoid zone (EZ) disruption on SD-OCT with progression of diabetic retinopathy.

Our current study has correlated significantly the decrease in visual acuity with increase in the severity of retinopathy, similar to studies concluded by Falkenstein et al. We found in our study that decrease in BCVA was significantly correlated with increased CST and CAT and was in accordance with the study conducted by Sasaki et al. But in a study by Otani et al., CST was found to be weakly and negatively correlated with BCVA. Significant correlation has been found between OCT patterns of clinically significant diabetic macular edema and severity of retinopathy, macula thickness and BCVA.

The study by Wu et al. demonstrated that heavily oxidized-glycated LDL induced the activation of caspase, mitochondrial dysfunction and apoptosis in human retinal capillary pericytes suggesting potentially important role of extravasated, modified LDL in promoting DR by promoting apoptotic pericyte loss. Recently it has also been shown that levels of circulating oxidized LDL immune complexes (ox-LDL-ICs) predicts the development of DR. In retinal sections from people with type 2 diabetes mellitus, ox-LDL and IgG was present proportionate to DR severity. Ox-LDL-IC exhibited greater cytotoxicity than ox-LDL toward retinal pericytes. Another study elaborated the role of lipids in diabetic retinopathy by studying the effect of cholesterol lowering agents i.e.statins on BRB in DR. Statins normalize the expression of pro-inflammatory factors which are drastically up-regulated in diabetic retina. This further supports the role of lipids in pathogenesis of DME.
### Table 1: Summary (Mean ± SD) of central subfield thickness and cube average thickness in study group

<table>
<thead>
<tr>
<th>Variable</th>
<th>Controls</th>
<th>No DR</th>
<th>NPDR</th>
<th>PDR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean of central subfield thickness (µm)</td>
<td>239.90 ± 11.52</td>
<td>244.73 ± 31.63</td>
<td>313.35 ± 120.05</td>
<td>367.1 ± 119.9</td>
</tr>
<tr>
<td>Mean of cube average thickness (µm)</td>
<td>244.31 ± 12.41</td>
<td>264.52 ± 16.10</td>
<td>303.58 ± 52.42</td>
<td>319.6 ± 73.56</td>
</tr>
</tbody>
</table>

### Table 2: Various Biochemical Parameters among different groups

<table>
<thead>
<tr>
<th>Variable</th>
<th>Controls</th>
<th>No DR</th>
<th>NPDR</th>
<th>PDR</th>
</tr>
</thead>
<tbody>
<tr>
<td>HbA1C (±0.61)</td>
<td>6.18 ± 0.61</td>
<td>7.197 ± 1.13</td>
<td>8.064 ± 1.64</td>
<td>8.248 ± 1.48</td>
</tr>
<tr>
<td>S. Urea (mg/dl)</td>
<td>28.56 ± 4.67</td>
<td>30.22 ± 11.10</td>
<td>42.22 ± 11.24</td>
<td>52.24 ± 11.60</td>
</tr>
<tr>
<td>S. Creatinine (mg/dl)</td>
<td>0.56 ± 0.06</td>
<td>0.78 ± 0.22</td>
<td>0.89 ± 0.25</td>
<td>1.27 ± 0.44</td>
</tr>
<tr>
<td>S. cholesterol (mg/dl)</td>
<td>141.36 ± 23.64</td>
<td>171.18 ± 41.59</td>
<td>176.15 ± 36.11</td>
<td>205.51 ± 61.67</td>
</tr>
<tr>
<td>S. triglyceride (mg/dl)</td>
<td>90.90 ± 10.99</td>
<td>127.1 ± 46.78</td>
<td>128.19 ± 51.19</td>
<td>157.24 ± 38.11</td>
</tr>
<tr>
<td>S. high density lipoprotein (mg/dl)</td>
<td>45.23 ± 7.89</td>
<td>44.44 ± 14.93</td>
<td>43.41 ± 15.69</td>
<td>39.07 ± 10.88</td>
</tr>
<tr>
<td>S. low density lipoprotein (mg/dl)</td>
<td>72.21 ± 15.39</td>
<td>93.71 ± 42.90</td>
<td>102.29 ± 33.81</td>
<td>127.17 ± 55.17</td>
</tr>
<tr>
<td>S. very low density lipoprotein (mg/dl)</td>
<td>24.57 ± 7.71</td>
<td>27.46 ± 15.99</td>
<td>26.25 ± 9.32</td>
<td>31.09 ± 9.17</td>
</tr>
</tbody>
</table>

### Table 3: Correlation of Various Biochemical Parameters with CST, CAT and Visual Acuity

<table>
<thead>
<tr>
<th>CST (µm)</th>
<th>CAT (µm)</th>
<th>logMAR visual acuity</th>
<th>Value</th>
<th>Correlation(r)</th>
<th>P value</th>
<th>Correlation(r)</th>
<th>P value</th>
<th>Correlation(r)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>S. Urea (mg/dl)</td>
<td>0.212</td>
<td>0.01</td>
<td>0.302</td>
<td>&gt;0.05</td>
<td>0.211</td>
<td>0.02</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S. Creatinine (mg/dl)</td>
<td>0.107</td>
<td>&gt;0.05</td>
<td>0.213</td>
<td>&gt;0.05</td>
<td>0.116</td>
<td>0.03</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S. cholesterol (mg/dl)</td>
<td>0.172</td>
<td>0.135</td>
<td>0.403</td>
<td>0.00</td>
<td>0.292</td>
<td>0.010</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S. high density lipoprotein (mg/dl)</td>
<td>-0.120</td>
<td>0.297</td>
<td>-0.42</td>
<td>0.714</td>
<td>-0.148</td>
<td>0.010</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S. low density lipoprotein (mg/dl)</td>
<td>0.192</td>
<td>0.095</td>
<td>0.343</td>
<td>0.02</td>
<td>0.312</td>
<td>0.06</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S. very low density lipoprotein (mg/dl)</td>
<td>0.63</td>
<td>0.585</td>
<td>0.159</td>
<td>0.167</td>
<td>0.041</td>
<td>0.723</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visual acuity lipoprotein (mg/dl)</td>
<td>0.28</td>
<td>0.04</td>
<td>0.262</td>
<td>0.018</td>
<td>1.00</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The study by Sasaki et al. associated high LDL with increased CSMT and CSMV in diabetic patients without DME. High serum cholesterol, LDL and non HDL levels were also found to be associated with retinal hard exudate formation, macular edema, decreased BCVA and with DME in patients of type 2 DM.

Our recent study highlighted, significant correlation of deranged lipid profile with ELM and EZ disruption. Deranged lipid profile was found to have a significant correlation with progression of diabetic retinopathy in our present study which is in harmony of previous studies where high TGs and low HDL were found to be associated with increased severity of DR. This present study significantly positively correlated increased serum levels of CHO and LDL levels with increased CAT but not with increased CST.

In our study increased serum CHO, LDL and decreased HDL was found to be significantly correlated with decrease in BCVA.

CONCLUSION

Increased serum urea is significantly correlated with increased CST. Increased serum CHO, LDL and decreased serum HDL is significantly correlated with decreased BCVA.

Increased serum CHO and LDL is significantly correlated with increased CAT. Increased CST and increased CAT were positively correlated with decreased BCVA.

REFERENCES

7. Emily C, Michael K, Frederick L. Association of Elevated Serum Lipid Levels With Retinal Hard Exudate in Diabetic Retinopathy Early Treatment Diabetic


