



Visual Acuity and Contrast Sensitivity after Retinal Detachment Surgery

Author's Affiliation

Dr. Tehseen Mahju

Farzana Naseem

Correspondence Author:

Correspondence to:

Dr. Tehseen Mahju
Vitreoretinal Consultant
College of Ophthalmology &
Allied Vision Sciences

Objective: To evaluate visual acuity (VA) and contrast sensitivity (CS) changes after surgery for retinal detachment (RD).

Method: A total of thirty patients undergoing surgery for retinal detachment were observed up to two visits after surgery. Functional success or failure of surgery for retinal detachment was assessed by assessing visual acuity (VA) and contrast sensitivity (CS) after surgery. VA and CS of these patients were obtained before retinal detachment surgery and at two visits (1st visit after 1week while 2nd visit after 1 month) after surgery for retinal detachment. VA was assessed by using Snellen chart placed at 6m distance while CS was obtained by using Lea symbols CS chart.

Results: Improvement in VA is seen in 70% of the patients, while 23.33% patients have not improved their VA at 1st visit. 6.66% patients reduce their VA up to 1st visit post-operatively. At 2nd visit, improvement in VA is seen in 79.99% of patients. 6.66% patients did not improve and 13.33% patients have reduced VA. Contrast sensitivity (CS) of 30% patients did not improve, and 3.32% patients had reduced CS while 56.66% patients have improved their CS up to 1st visit. At 2nd visit, 72.66% patients have improved their CS while 16.67% patients have not improved. Only 9.99% patients have reduced their CS up to 2nd visit post-operatively. **Conclusion:** Visual acuity (VA) and contrast sensitivity (CS) was significantly improved after surgery for retinal detachment (RD). RD surgery has good prognosis if patient has no other pathology which cause disturbance in vision. Post-operative visual (VA and CS) outcome mainly depends upon pre-operative visual functioning.

Key words: Visual acuity, contrast sensitivity, retinal detachment surgery



Introduction:

Retinal detachment (RD) is traditionally defined as detachment of neurosensory retina (NSR) from retinal pigment epithelium (RPE). There are three main types of RD: Rhegmatogenous retinal detachment (RRD) is most common sight threatening type of RD which involves penetration of liquefied vitreous under the retina as a result of retinal tear. In tractional retinal detachment (TRD), neurosensory retina is pulled away from RPE as in diabetic retinopathy.

In exudative RD, sub retinal fluid accumulates with in sub retinal space. This is mainly due to adverse changes in vascular permeability of choroidal vessels or damage to retinal pigment epithelium⁵.

Visual functions are commonly assessed in terms of visual acuity. Visual acuity and contrast sensitivity are two major visual functions and correlate well. Decrease in visual acuity occurs as a result of many disease conditions. Contrast sensitivity function is effected by photoreceptor changes due to any pathological changes of retina.

Retinal detachment is less common among pediatric population than in elders. This may arise due to associated factors such as inherited high myopia or degenerative changes in retina and vitreous, ocular trauma, retinopathy of prematurity (ROP) and low socioeconomic status⁷. Contrast sensitivity function is also effected by photoreceptor changes due to any pathological changes of retina. No matter which method is used for surgery, visual acuity and contrast sensitivity after RD surgery depend upon preoperative and postoperative factors.

Preoperative factors:

- Visual acuity
- Contrast sensitivity
- Refractive status
- Detachment duration before surgery
- Gender
- Foveal involvement
- Lens status
- Diabetes mellitus
- Trauma
- Cataract surgery etc.

Postoperative factors:

- Visual acuity
- Contrast sensitivity
- Retinal reattachment status
- Complication after surgery etc.^{1,2,3}

There is close relationship between visual acuity and contrast sensitivity in determining visual functions of patient. Most studies shows visual acuity improves while contrast sensitivity reduced after retinal detachment surgery. Contrast sensitivity significantly affected by retinal disorders

especially diabetic retinopathy. If patients with retinal detachment were also diabetic, contrast sensitivity would be more effected.

Refractive surgery such as laser in situ keratomileusis (LASIK) and laser assisted subepithelial keratomileusis (LASEK) and myopia correlate well with retinal detachment. After refractive surgery, high myopic patients develop retinal detachment earlier, rather than in patients after refractive surgery without myopia.

Many studies shows visual acuity improves or remain same after retinal detachment surgery in most of cases and drastically reduce in some cases, while contrast sensitivity significantly decreases after surgery. Some investigators proved that visual acuity remain same after surgery but contrast sensitivity decreases. Associated diabetic retinopathy will drastically affect contrast sensitivity.

Material and Methods:

Study design:

- Cross sectional study.

Sampling method:

- Non probability convenient sampling method.

Sampling size:

- 30 patients

Dependent variable:

- Visual Acuity
- Contrast Sensitivity

Independent variable:

- Age
- Gender

Place of study:

Vitreoretina clinic of Eye Opd at Mayo Hospital Lahore.

Duration of study:

From August 2014 to December 2014

Inclusion criteria:

- Between 15 to 60 years of age
- Patients undergoing retinal detachment surgery
- Verbal and co-operative patients

Exclusion criteria:

- Mentally retarded patients
- Uncooperative patients
- Patients having other ocular pathology

Population:

All patients to Vitreoretina clinic, fulfilling inclusion criteria of the study in eye OPD Mayo hospital Lahore.

Data collection method:

Data were collected by clinical examination and recording the results in self designed Performa.

Instruments/equipment to be used:

- Snellen visual acuity chart
- Lea symbols contrast sensitivity chart
- Pen torch
- autorefractrometer

Data analysis method:

All the data were entered and analyzed using Statistical Package for Social Science (SPSS Version 20.0). Quantitative variables like age were presented in form of mean ± SD. Significance was assessed at the P < 0.05 levels for all parameters.

Table:1 visual acuity:pre-operative * visual acuity:post-op:1st visit

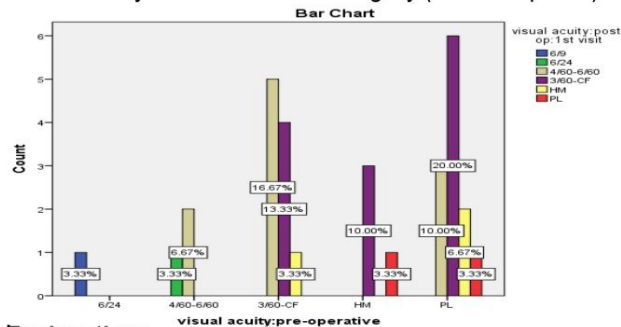
| | | visual acuity:post -op:1st visit | | | | | | Total |
|-----------------------------|-------------|----------------------------------|------|--------------|------------|----|----|-------|
| | | 6/9 | 6/24 | 4/60 6/60 | 3/60 CF | HM | PL | |
| visual acuity:pre operative | 6/24 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| | 4/60 - 6/60 | 0 | 1 | 2 | 0 | 0 | 0 | 3 |
| | 3/60 -CF | 0 | 0 | 5 | 4 | 1 | 0 | 10 |
| | HM | 0 | 0 | 0 | 3 | 0 | 1 | 4 |
| | PL | 0 | 0 | 3 | 6 | 2 | 1 | 12 |
| Total | | 1 | 1 | 10 | 13 | 3 | 2 | 30 |

Explanation:

This table shows the comparison of pre-operative visual acuity and post-operative visual acuity at 1st visit.

Figure:1

Visual Acuity before and after Surgery (1st Post op visit)



Explanation:

This figure shows that improvement in VA is seen in 70% of the patients. VA of 23.33% patients did not improve at 1st visit. Only 6.66% patients had reduced VA up to 1st visit post-operatively.

Table:2

Pre-op visual acuity vs. Visual acuity at 2nd post op visit visual acuity:pre-operative * visual acuity:post-op:2nd visit

| | | visual acuity:post -op:2nd visit | | | | | | | | Total |
|-----------------------------|-------------|----------------------------------|------|------|------|--------------|------------|----|----|-------|
| | | 6/9 | 6/18 | 6/24 | 6/36 | 4/60 6/60 | 3/60 CF | HM | PL | |
| visual acuity:pre operative | 6/24 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | 4/60 - 6/60 | 0 | 1 | 0 | 0 | 0 | 2 | 0 | 0 | 3 |
| | 3/60 -CF | 0 | 1 | 2 | 2 | 3 | 1 | 1 | 0 | 10 |
| | HM | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 1 | 4 |
| | PL | 1 | 2 | 1 | 1 | 3 | 3 | 0 | 1 | 12 |
| Total | | 2 | 4 | 3 | 3 | 7 | 8 | 1 | 2 | 30 |

Figure:2

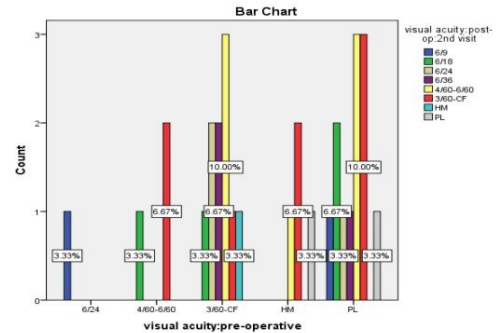


Figure:2 shows that improvement in VA is seen in 79.99% of patients. 6.66% patients have not improved or remained same their VA. While only 13.33% patients has reduced their VA up to 2nd visit post-operatively.

Table:3 Contrast sensitivity: pre-operative * contrast sensitivity: post-op:1st visit

| | | contrast sensitivity:post -op:1st visit | | | | Total |
|---------------------------------------|------------|---|-----|----|------|-------|
| | | loss of CS | 25% | 5% | 2.5% | |
| co ntrast sensitivity: pre -operative | loss of CS | 6 | 15 | 0 | 1 | 22 |
| | 25% | 1 | 3 | 0 | 0 | 4 |
| | 10% | 0 | 0 | 0 | 1 | 1 |
| | 5% | 0 | 1 | 0 | 0 | 1 |
| | 1.25% | 0 | 0 | 1 | 0 | 1 |
| Total | | 7 | 19 | 2 | 2 | 30 |

Figure:3

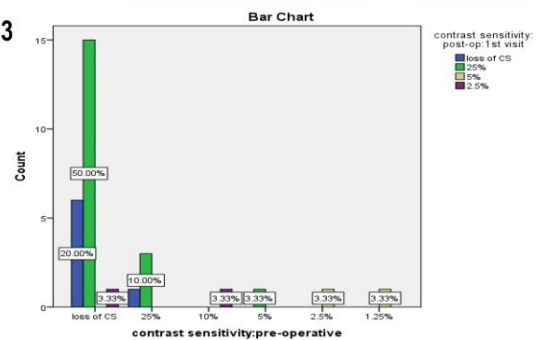


Fig:3 shows that CS of 30% patients have not improved while 13.32% patients have reduced CS. 56.66% patients have improved their CS up to 1st visit.

Table:4 contrast sensitivity: pre-operative * contrast sensitivity:post-op:2nd visit

| | | contrast sensitivity:post op:2st visit | | | | | Total |
|---------------------------------------|------------|--|-----|----|-------|---|-------|
| | | loss of CS | 25% | 5% | 1.25% | | |
| co ntrast sensitivity: pre -operative | loss of CS | 3 | 7 | 5 | 4 | 3 | 22 |
| | 25% | 0 | 2 | 1 | 1 | 0 | 4 |
| | 10% | 0 | 0 | 0 | 0 | 1 | 1 |
| | 5% | 1 | 0 | 0 | 0 | 0 | 1 |
| | 1.25% | 1 | 0 | 1 | 0 | 0 | 1 |
| Total | | 6 | 9 | 2 | 5 | 4 | 30 |

Figure:4

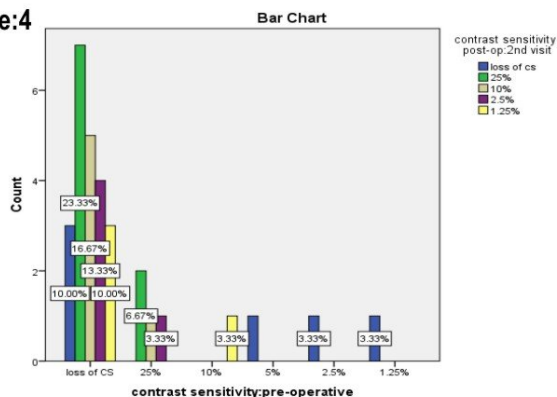
**Explanation:**

Fig. 4 shows that, 72.66% patients have improved CS up to 2nd visit.

Discussion:

Vision is most important function of eyes that plays important role in our daily life. A retrospective study was performed for patients who undergo retinal detachment surgery. Finally, improved visual outcome was achieved in 44.4% eyes. Good visual acuity was predicted by: good VA, absence of proliferative vitreoretinopathy, macula on, primary repairment of a traumatic globe, clear lens (Phakic), no postoperative complications, no recurrence of RRD and no epiretinal membrane. So, favorable visual outcome was achieved after RRD surgery.

Many studies shows that visual acuity (VA) and contrast sensitivity (CS) improves or remain same after retinal detachment surgery in most of cases and reduce in some cases after surgery. Associated diabetic retinopathy (DR) will drastically affect contrast sensitivity.

It was studied that the loss of vision among diabetic patients was mainly due to retinal detachment associated with macular edema. Prognosis of macular edema was satisfactory but prognosis may be poorer if it was associated with detachment of neurosensory retina. Hypertension has strong relation with diabetes. Malignant hypertension leads to leakage of capillaries of choroid. Disruption of choroidal vasculature due to malignant hypertension cause retinal detachment in patients with diabetic macular edema. Hence, hypertension is major risk factor for retinal detachment among diabetic patients.

In another study, quality of life along with visual functions was assessed after RD surgery. Visual functions of operated eye were compared with visual functions of fellow eye. Visual functions in relation to quality of life were not improved after surgery when compared with that of fellow eye. Visual functions are so important that they affect activities of daily life like driving, distance activities, near activities, social functioning related to vision etc. So, disturbance in visual

functions also disturb quality of life related to vision.

These VA and CS results show that VA and CS improved post-operatively at 1st visit while more significant improvement was seen at 2nd visit depending upon patient's VA and CS pre-operatively. This means that VA and CS are significantly improved up to 2nd visit after RD surgery.

Conclusion:

Visual acuity (VA) and contrast sensitivity (CS) was significantly improved after surgery for retinal detachment (RD). RD surgery has good prognosis if patient has no other pathology which cause disturbance in vision. Post-operative visual (VA and CS) outcome mainly depends upon pre-operative visual functioning.

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