# Idiopathic Macular Hole Repair: A non-linear relationship between pre-operative and post-operative visual acuity

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**Background** Following macular hole surgical repair, about half of the patients achieve VA of 20/50 or better in the operated eye (Smiddy et al. 1997; Park et al. 1999; Brooks 2000, among others). However, no thorough quantitative correlation between pre-operative and post-operative visual acuity has been reported.

**Objective** To determine the change in visual acuity following macular hole repair and determine its association with pre-operative visual acuity.

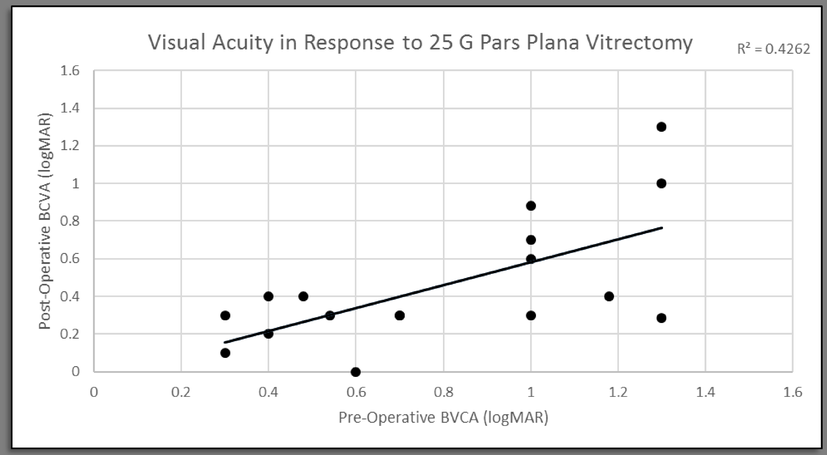
**Methods**

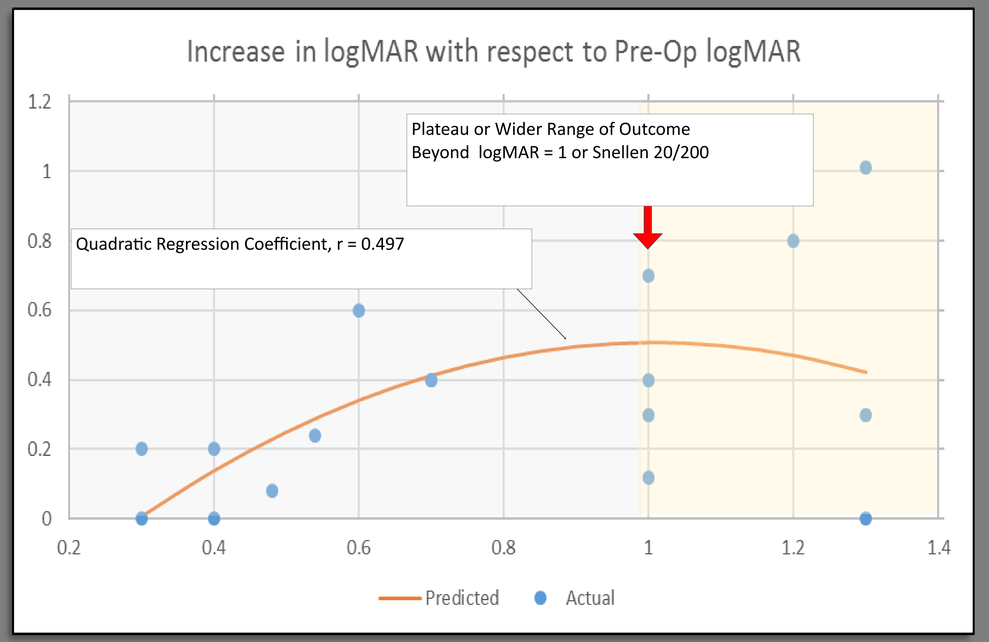
- Retrospective single surgeon consecutive case series over a 12 month period: 17 eyes of 17 patients.
- Standard 25 gauge pars plana vitrectomy, ILM peeling by indocyanine green dye and $C_3F_8$ gas at 16%.
- In some cases, intravitreal Kenalog injection assisted peeling of epiretinal membrane before ILM peel.
- Patients must have an idiopathic full thickness macular hole on OCT.
- Size of the hole was not a criterion in this study. All eyes were pseudophakic prior to macular hole repair.
- No other maculopathy was identified in any of the study eyes.
- A minimum follow up period of 6 months.
- Pre-operative pseudophakic best corrected visual acuity obtained within a month of the surgery and the best corrected post-operative visual acuity obtained at 6 months of the study were compared.

**Results**

- Macular hole closed in 100% of the patients. Visual acuity improved in 14 out of 17 or 82.3%.
- 11 out of 17 (about 65%) patients achieved 20/50 or better vision.
- Mean visual acuity pre-operatively was 20/125 which improved post-operatively to 20/60.
- Correlation coefficient between the pre- and post-operative logMAR visual acuity, r of 0.65 or $r^2$ of 0.42.
- A better pre-operative visual acuity leads to a greater improvement in vision post-operatively (quadratic correlation coefficient, r of 0.5). However, there is a non-linear trend of vision improvement.
- The improvement in visual acuity with surgery slows down as pre-operative vision worsens and eventually plateaus between 20/125 and 20/200.
- Beyond 20/200 there is a greater scatter and unpredictability in post-operative visual acuity.

| Patient | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pre-Op Snellen | 20/50 | 20/60 | 20/200 | 20/80 | 20/400 | 20/40 | 20/50 | 20/100 | 20/40 | 20/300 | 20/200 | 20/70 | 20/200 | 20/400 | 20/100 | 20/200 | 20/400 | 20/125 |
| Post-Op Snellen | 20/30 | 20/50 | 20/40 | 20/20 | 20/70 | 20/40 | 20/50 | 20/40 | 20/25 | 20/50 | 20/100 | 20/40 | 20/150 | 20/200 | 20/40 | 20/80 | 20/400 | 20/60 |
| Pre-Op logMAR | 0.4 | 0.48 | 1 | 0.6 | 1.3 | 0.3 | 0.4 | 0.7 | 0.3 | 1.2 | 1 | 0.54 | 1 | 1.3 | 0.7 | 1 | 1.3 | 0.79 |
| Post-Op logMAR | 0.2 | 0.4 | 0.3 | 0 | 0.29 | 0.3 | 0.4 | 0.3 | 0.1 | 0.4 | 0.7 | 0.3 | 0.88 | 1 | 0.3 | 0.6 | 1.3 | 0.457 |




**Discussion**

The observed non-linear trend between the pre-operative and post-operative best-corrected visual acuity may be due to the degree of pre-operative irreversible foveal damage. A major limitation of the study is that no data was recorded regarding the status of the posterior capsule opacification, dry eyes, or other (non-retina related) causes for change in vision. Nevertheless, the findings are interesting enough that a prospective study with more rigorous criteria, but with the same specific aim may be warranted.

**Conclusions**

The degree of visual acuity improvement following repair of idiopathic macular holes with vitrectomy is dependent on pre-operative vision. This trend is non-linear: it slows down with worsening pre-operative vision, then plateaus in the 20/125 to 20/200 region. Beyond 20/200 the change in visual acuity is still positive, but becomes unpredictable.

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**Disclosures: None**