RETINAL NERVE FIBER LAYER THICKNESS MODIFICATIONS AFTER INTERNAL LIMITING MEMBRANE PEELING

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**Purpose:**
To identify retinal nerve fiber layer (RNFL) thickness modifications after internal limiting membrane (ILM) peeling for idiopathic macular hole (MH) and epiretinal membrane (ERM) and to correlate it to visual field (VF) changes and to postoperative appearance of early transient edematous swelling of the arcuate RNFL (SANFL) and of later dissociated optic nerve fiber layer (DONFL).

**Methods:**
- Intervventional, prospective, non randomized case series.
- 30 eyes of 30 patients (73.5 ± 6.6 years), who underwent brilliant blue G-assisted ILM peeling for idiopathic MH and ERM.
- Patients were evaluated at baseline and 1, 3 and 6 months after surgery.
- A complete ophthalmic examination and color (Topcon fundus camera, Topcon Medical System, Oakland, NJ), autofluorescence (AF), blue light images, spectral domain OCT (SD-OCT) of the macular region and of the peripapillary RNFL (Spectralis HRA+OCT, Heidelberg Engineering, Heidelberg, Germany), were performed in both eyes at each visit.
- Six peripapillary sectors (superotemporal, temporal, inferotemporal, inferonasal, nasal, superonasal) and global RNFL thickness, were evaluated.
- VF (Humphrey central 30-2) was performed preoperatively and 6 months postoperatively.
- Data were analyzed using Friedman, Mann-Whitney, Wilcoxon, Spearman and Fisher tests.

**Results:**
- BCVA, expressed in LogMAR, significantly improved after surgery (0.51 ± 0.29 vs 0.14 ± 0.16, Friedman test p<0.001).
- Sectoral and global RNFL thickness showed significant modifications during follow-up period (for all variables p<0.0001, Friedman test).
- Significant correlation was found between preoperative and postoperative RNFL thickness in each sector evaluated (Spearman test, p<0.001). One month after surgery, an average increase of RNFL thickness of 10.2±4.9µm was noted. Subsequently, an average reduction of the superotemporal, inferotemporal and temporal RNFL thickness of 18.2±9.8µm was seen 6 months after surgery.
- No IOP and VF difference was found in the study eye during the follow up period and when compared to the fellow eye.
- SANFL appearance was found in 17 patients (56%), while DONFL appearance in 15 (50%).
- No correlation was found between RNFL thickness and neither VF nor SANFL or DONFL appearance.

**Conclusions:**
Macular surgery leads to significant peripapillary RNFL thickness modifications. Specifically, the global first postoperative month RNFL thickness increase could be due to a diffuse inflammatory process related to pars plana vitrectomy. The selective 8th-month reduction of the temporal, superotemporal and inferotemporal RNFL thickness, without VF defects, could indicate an early damage to the arcuate RNFL related to ILM peeling. The average thickness reduction of these sectors should be taken particularly into account when surgery is performed in patients affected by glaucoma or other optic neuropathies.

The authors have no conflict of interests to declare.

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*Comparison of global and sectoral peripapillary RNFL thickness during the 6 months follow-up period.*

<table>
<thead>
<tr>
<th>Sector</th>
<th>Preoperative</th>
<th>1 month</th>
<th>3 months</th>
<th>6 months</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global</td>
<td>105.5±4.25</td>
<td>120.6±8.25</td>
<td>76.8±15.9</td>
<td>71.5±17.82</td>
<td>&lt;0.001</td>
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<tr>
<td>Superotemporal</td>
<td>109.3±4.25</td>
<td>117.8±14.72</td>
<td>71.9±17.42</td>
<td>56.0±18.42</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Temporal</td>
<td>95.0±5.78</td>
<td>118.0±16.88</td>
<td>57.2±14.72</td>
<td>53.0±17.62</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Inferotemporal</td>
<td>112.5±5.81</td>
<td>114.8±17.84</td>
<td>54.8±15.85</td>
<td>52.8±19.86</td>
<td>&lt;0.001</td>
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<tr>
<td>Inferonasal</td>
<td>150.6±7.68</td>
<td>119.8±14.8</td>
<td>77.8±16.38</td>
<td>77.5±18.34</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>nasal</td>
<td>72.0±12.38</td>
<td>85.3±12.54</td>
<td>76.9±15.37</td>
<td>58.9±17.65</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>superonasal</td>
<td>152.6±6.78</td>
<td>137.6±14.7</td>
<td>70.8±15.9</td>
<td>78.9±17.85</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

*Statistically significant difference when compared to preoperative values.*

**Figure 1.** Detection of RNFL thickness modifications using the follow-up method. Preoperative peripapillary RNFL scan of a patient with ERM (A) was set as reference for follow-up measurements. Note the overall RNFL thickness increase 1 month after ILM peeling as documented by the green space in the graph of the figure B (see red ellipse), the return to basal values 3 months after surgery (figure C) and the 6 months RNFL thickness decrease in the superotemporal, temporal and inferotemporal sectors as documented by the red space in the graph of the figure D (see red arrows).

**Figure 2.** SD-OCT retinal nerve fiber layer thickness before and 1, 3 and 6 months after ILM peeling in a patient with MH. Note that, 1 month after surgery, SANFL appearance (yellow arrow) was detectable on infrared image and that it corresponded to an increase of RNFL thickness (green line) on OCT image. SANFL disappeared after 3 postoperative months. A progressive RNFL decrease was seen 6 months after surgery and the software-based internal control classified the superotemporal and inferotemporal scans as pathological (red areas on the bottom right figure). Instead, the yellow areas in the right figures were classified as borderline.