Zofia Michalewska, Zofia Nawrocka, Jerzy Nawrocki

Swept Source OCT Angiography after scleral buckling

Ophthalmic Clinic Jasne Blonia
No financial interest to disclose
Summary

Purpose
To evaluate macular microvasculature with special regard to fovea avascular zone and vessel density in eyes with rhegmatogenous retinal detachment (RRD) treated with scleral buckling.

Methods
It is a retrospective, interventional study. Inclusion criteria were as follows: signed informed consent, scleral buckling as the only retinal surgery in the evaluated eye, swept source OCT Angiography (SS-OCT A) performed at least twice during regular follow- up controls for at least 24 months after surgery, anatomic success achieved after primary surgery. In all eyes a complete ophthalmic examination, swept source OCT and SS-OCTA were performed. We measured visual acuity, central retinal thickness, central choroidal thickness, intraretinal changes in the fovea, vessel density at the level of superficial and deep retinal plexus, area of fovea avascular zone (mm$^2$) at the level of superficial and deep retinal plexus.

Results
74 eyes of 72 patients (40 males, 32 female) were in the mean age of 48 years were included into the analysis. 24 eyes had a macula on RRD and were classified into group one and 50 eyes had macula off RRD and were classified into group two. Mean visual acuity was significantly better in group one (p<0.05). Mean central retinal thickness did not change significantly in any subgroup (p=0.06; p=0.2) and did not differ between them (p=0.32. There was statistically significant decrease in central choroidal thickness six months after surgery in group one (median 247μm to 216μm, p=0.047). sFAZ and dFAZ did not differ significantly at any time point for any group (p=1.0, p=0.78). One month after surgery vessel density at the level of deep retinal capillary plexus was statistically significant lower in group two- both, when compared to group one (p=0.01) or to fellow eyes (p<0.001).

Conclusions
Patients with a macula-off retinal detachment had decreased vessel density one month after surgery, which normalized at later timepoints. This study confirms that in regard to vessels visualized with SS-OCT A scleral buckling does not seem to influence foveal choroidal vasculature in the long term. Vasculature in patients treated with a cerclage, even after a macula-off retinal detachment tend to normalize in the long-term.
CCT, sFAZ, dFAZ and vessel density measured with OCTA were reported to be deferred after ppV for RD. No data on SB
Material and Methods

- Retrospective observational study
- Inclusion criteria: signed informed consent, **scleral buckling** as the only retinal surgery in the evaluated eye, swept source OCT Angiography (SS-OCT A) performed at least twice during regular follow-up controls for at least 24 months after surgery, anatomic success achieved after primary surgery
- Following parameters were measured: visual acuity, central retinal thickness, central choroidal thickness, intraretinal changes in the fovea, vessel density at the level of superficial and deep retinal plexus, area of fovea avascular zone (mm²) at the level of superficial and deep retinal plexus.
Results

- 74 eyes of 72 patients (40 males, 32 female), mean age 48 years

<table>
<thead>
<tr>
<th></th>
<th>Group 1 Macula on</th>
<th>Group 2 Macula off</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>24</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>0.78</td>
<td>0.32</td>
<td>0.01</td>
</tr>
<tr>
<td>Age</td>
<td>45</td>
<td>50.4</td>
<td>0.1</td>
</tr>
<tr>
<td>Pseudophakia</td>
<td>3/24 (12.5%)</td>
<td>7/50 (14%)</td>
<td>0.6</td>
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</tbody>
</table>
CRT did not change in any subgroup (p=0.06, p=0.2)
CCT significantly decreased one week after surgery in group 2 (p=0.044).

<table>
<thead>
<tr>
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<tbody>
<tr>
<td></td>
<td>Macula on</td>
<td>Macula off</td>
<td></td>
</tr>
<tr>
<td>Final CRT</td>
<td>248μm</td>
<td>274μm</td>
<td>0.32</td>
</tr>
<tr>
<td>Initial CCT</td>
<td>289μm</td>
<td>248μm</td>
<td>0.35</td>
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<tr>
<td>CCT one month after surgery</td>
<td>260.8μm</td>
<td>200.47μm</td>
<td></td>
</tr>
<tr>
<td>Final CCT</td>
<td>227.9μm</td>
<td>236.2μm</td>
<td>0.58</td>
</tr>
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</table>
Vessel density

- One month after surgery vessel density at the level of deep capillary plexus was significantly lower in group two - both when compared to group one ($p=0.01$) and to fellow eyes ($p<0.01$).
- It normalized until month six.
One month after surgery CRT correlated with dFAZ in group one (r=-0.2, p=0.008) and two (r=-0.4, p=0.0001)

This correlation persisted (p<0.05)
## Postoperative complications

<table>
<thead>
<tr>
<th></th>
<th>Group 1</th>
<th>Group 2</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Macular edema</td>
<td>1/24 (4%)</td>
<td>5/50 (10%)</td>
<td>0.3</td>
</tr>
<tr>
<td>Increased intraocular pressure</td>
<td>4/24 (16%)</td>
<td>6/50 (12%)</td>
<td>0.7</td>
</tr>
<tr>
<td>Cataract</td>
<td>2/24 (8.3%)</td>
<td>6/50 (12%)</td>
<td>0.8</td>
</tr>
</tbody>
</table>
Etiopathogenesis:
- pressure on vessels induced by the buckle) Bonfiglio 2015
- Inflammation (Increased levels of cytokines and PG lead to defects in the blood/retina barrier and in turn to accumulation of intraxetinal fluid

Treatment:
Mean 4.5 Injections/8 months of:
- Aflibercept
- Bevacizumab
- Dexamethasone implant
Macular edema

- Lower prevalence than in earlier studies (10% vs. 25-30%: Lobes 1980, Tunc 2007) probably due to lack of aphakia and lower age

- Multiple linear regression analysis revealed that the only analyzed factor associated with the occurrence with macular edema was the age of patients (median 57 vs. median 49 years; p=0.0.018). However, macular edema was also observed in one patient's age 24.

- Mean vessel density in patients, who later developed macular edema was 58%

- Mean vessel density in other eyes was 49%
Vessel density at the level of deep retinal plexus

- One month after surgery lower in group two - both, when compared to group one (p=0.01) or to fellow eyes (p<0.001)
- It normalized already during the month 3 control
Conclusions

❖ Vessel density one month after surgery was lower in eyes with macula off RD
❖ It normalized at later timepoints
❖ In regard to vessels visualized in SS-OCT A placement of a scleral buckle does not seem to influence foveal choroidal vasculature in the long term
❖ Vasculature in patients after macula-off RD and cerclage normalizes in the long-term