HYPERBARIC OXYGEN THERAPY & REFRACTIVE CHANGES

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Background:
Hyperbaric oxygen therapy (HBOT) has a growing number of therapeutic indications; both for acute emergencies and scheduled therapy. Patients receiving scheduled HBOT have been observed to demonstrate myopic changes. Older studies have reported myopic shifts from 1.6 D to 6.5 D1,2. Recently, Fledelius et al. reported a much smaller myopic shift of 0.49 D. Each of these studies followed corneal curvature during HBOT3; three also followed axial length4. No significant change in either of these parameters were found in any study. These findings are highly suggestive of a lenticular origin of refractive change. While the changes have been subjectively reported to be reversible, no study has evaluated the reversibility of the induced myopic changes.

Results:
Of 72 consecutive patients, 79 eyes from 40 patients were included in this study; 69 were phakic and 10 were pseudophakic. Average age was 58.6 (20.7 to 87.8) years. Indications for HBOT and systemic co-morbidities are listed below.

<table>
<thead>
<tr>
<th>Indication</th>
<th># of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peripheral Vascular Disease</td>
<td>12</td>
</tr>
<tr>
<td>Refractive Osteomyelitis</td>
<td>10</td>
</tr>
<tr>
<td>Osteoradionecrosis</td>
<td>9</td>
</tr>
<tr>
<td>Soft tissue radionecrosis</td>
<td>8</td>
</tr>
<tr>
<td>Wound healing</td>
<td>2</td>
</tr>
</tbody>
</table>

Significant Refractive Change

<table>
<thead>
<tr>
<th>Lens status</th>
<th># of patients</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phakic</td>
<td>36</td>
<td>69</td>
</tr>
<tr>
<td>(-1.50 D)</td>
<td>(-0.09)</td>
<td></td>
</tr>
<tr>
<td>Pseudophakic</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>46</td>
<td>79</td>
</tr>
</tbody>
</table>

Predictive Factors – Age
- Age x degree of induced myopia
- \( p = 0.026 \)

Predictive Factors – Treatments
- # of treatments x degree of induced myopia
- \( p = 0.05 \)

Secondary Results
Post Therapy Changes
To evaluate post therapy changes, those patients who had had multiple post HBOT visits were investigated. We evaluated recovery by those patients who maintained a significant change post therapy (\( >-0.75 \) D).

Discussion
The lenticular changes maybe secondary to either:
- Hyperoxgenation of the anterior chamber (which is physiologically is an anoxic environment)
- Hyperbaric exposure only
- Both pressure and oxygen effects

Secondly, it is unclear whether these changes result in changes to lens morphology or biochemistry. With the predictive factors gained through this study, the authors plan to further investigate lens morphology changes with aid of ultrasound biomicroscopy (performed by Dr. Charles Pavlin).

References