Effect of Homatropine eye drops on pain after photorefractive keratectomy: A pilot study

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Abstract

Purpose: To assess the effect of homatropine eye drops on pain after photorefractive keratectomy (PRK).

Methods: This randomized, double masked, interventional study included 15 patients (30 eyes) who underwent bilateral PRK. After operation, patients received homatropine eye drops, 4 times daily in only one eye (homatropine eye). The level of pain was evaluated using visual analogue scale (VAS), verbal rating scale (VRS) and pain rating index (PRI) at 0.5, 24 and 48 h after operation.

Results: The level of pain was statistically similar between the two eyes half an hour after operation, however, homatropine eyes had significantly less pain 24 h after operation compared to fellow eyes (2.5 ± 1.9 vs 5.3 ± 2.5, \(P = 0.004\) for VAS, 2.0 ± 1.2 vs 3.2 ± 0.9, \(P = 0.023\) for VRS, and 9.4 ± 5.7 vs 16.0 ± 9.0, \(P = 0.031\) for PRI). Also, 48 h after surgery, the pain scales were less in the homatropine eyes (2.3 ± 1.7 vs 4.0 ± 2.1, \(P = 0.014\) for VAS, 1.6 ± 1.0 vs 2.5 ± 1.0, \(P = 0.038\) for VRS, and 6.8 ± 5.7 vs 12.0 ± 8.9, \(P = 0.005\) for PRI). No delayed epithelial healing was observed.

Conclusion: Homatropine eye drops may be useful for reducing pain after Photorefractive keratectomy.

Keywords: Mydriatics, Pain, Photorefractive keratectomy
there is no published study on the effect of cycloplegics on post PRK pain. In this contralateral eye study we evaluated the effect of a topical cycloplegic drug, homatropine, on relieving pain following PRK.

Material and methods

In this double masked randomized clinical trial 15 patients (30 eyes), who were candidates for bilateral PRK surgery between August and October 2008 were included. Institutional review board and ethics committee approved the study. All patients underwent initial complete ocular examinations including manifest and cycloplegic refraction, slit lamp examination, intraocular pressure measurement, and dilated fundus examinations. Patients with hyperopia and high myopia (more than –6.00 diopters), previous ocular surgeries and history of neurosensory pain disorders were excluded.

Epithelium was removed using a spatula after instilling 20% alcohol over the cornea for 20 s. Laser ablation was performed using a Technolas 217 (Bausch & Lomb). Depth of ablation was based on the preoperative refractive error.

After corneal ablation, surgical sponge soaked in mitomycin C was placed over the cornea for 20 s and then cornea surface washed with 100 mL of balanced salt solution. After surgery a plano bandage contact lens was placed on the cornea and the contact lenses were removed at the third post-operative day. Postoperative medications were topical betamethasone, four times daily, topical chloramphenicol, four times daily and oral acetaminophen as needed by patient’s discretion. Topical homatropine (Sina Darou, Tehran, Iran), four times daily, was added to the postoperative medications for only one eye (homatropine eye). The patients were instructed to use the homatropine drops for the same eye and those who reported mistakes were excluded from the study. All patients were evaluated daily for epithelial wound healing and visual recovery. Randomization of the eyes was performed by one of the authors (SS). The surgeon, patients and psychiatrist evaluating patients’ pain were all unaware of the randomization process and the eye which was receiving homatropine drops.

All the procedures and medications were similar for both eyes except for homatropine drops. Before surgery, patients were oriented to pain questionnaire by the psychiatrist. Pain rating scales were explained to the patients and reevaluated to confirm understanding. Patients were asked about pain and discomfort in each eye and requested to express his/her pain experience with three different subjective pain scoring questionnaires: visual analogue scale (VAS), verbal rating scale (VRS) and Short-Form McGill Pain Questionnaire. For visual analogue scale, the patients were asked to indicate their pain sensation severity in a linear line marked from 0 for “no pain” to 10 for “the most severe intolerable pain I have ever experienced.”

For recording verbal rating scale (VRS), patients were asked to rate their experience of pain on the Keele verbal pain chart. This scale allowed them to score pain in a semiquantitative way: 0 = no pain, 1 = minimal pain, 2 = moderate pain, 3 = severe pain, and 4 = agonizing pain. Short-Form McGill Pain Questionnaire is a 15-item form of the longer McGill Pain Questionnaire. The questionnaire measures pain score as a sum of the sensory and affective pain rating index (S-PRI and A-PRI). Each descriptor is rated on a 4-point scale; none, mild, moderate or severe.

Data were entered using SPSS software (SPSS 15.0, SPSS Inc., Chicago, IL). Paired t test was used for analysis and P value less than 0.05 was considered significant.

Results

Thirty patients entered in this study. Fifteen patients were excluded due to using homatropine for both eyes or missed follow up. Data from 15 patients, each comprised of one homatropine treated and one control eye were analyzed. Mean corrected refractive error was not different between homatropine and control eyes (–3.73 ± 2.1 and –3.75 ± 1.9 respectively, P = 0.89).

Table 1 shows the pain scores of the patients. VAS, VRS and PRI scores, 0.5 h after operation, were not significantly different between homatropine and control eyes (P = 0.3, P = 0.1 and P = 0.5, respectively). 24 and 48 h after surgery, pain scores on VAS, VRS and PRI were all significantly lower in homatropine eyes. Thirteen homatropine eyes (86.6%) had a VAS score of less than 1 compared to control eyes both at 24 and 48 h after operation. Ten homatropine eyes (66.6%) had a VRS score of less than 1 compared to control eyes, 24 and 48 h after operation. This difference was observed in 12 homatropine eyes (80%) for PRI. Epithelium had been healed on the third day after surgery in all eyes and contact lens was removed simultaneously in both eyes.

Discussion

Photorefractive keratectomy is a safe and effective procedure for mild to moderate refractive error correction. It is the most widely used laser refractive surgery in the US military service. Post operative pain is one of the most significant disadvantages of PRK. Exposure of traumatized nerve endings causes severe postoperative pain which usually lasts for the first 3–4 days until corneal surface re-epithelialization occurs. There is not a general agreement on the best approach to manage postoperative pain in these patients. A variety of systemic and topical medications have been used for pain reduction after PRK. Oral non steroidal anti-inflammatory drugs (NSAIDs), gabapentine, and opiates are among oral medications that are being used so far with different success and complication rates. Topical NSAID drugs are one of the most popular medications to control post-PRK pain. Diclofenac and ketorolac have been approved by FDA for pain control with surface ablations. Bromfenac, a recently approved topical NSAID for the treatment of postoperative inflammation and pain after cataract surgery, has also been found to control pain following PRK. There are some

Table 1. Pain score on visual analogue scale (VAS), verbal rating scale (VRS) and pain rating index (PRI) at different time points after photorefractive keratectomy.

<table>
<thead>
<tr>
<th>Time (h)</th>
<th>Homatropine eye</th>
<th>Control eye</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>2.4 ± 2.1</td>
<td>3.4 ± 3.3</td>
<td>0.300</td>
</tr>
<tr>
<td>24</td>
<td>2.5 ± 1.9</td>
<td>5.3 ± 2.5</td>
<td>0.004</td>
</tr>
<tr>
<td>48</td>
<td>2.3 ± 1.7</td>
<td>4.0 ± 2.1</td>
<td>0.014</td>
</tr>
<tr>
<td>0.5</td>
<td>1.6 ± 1.2</td>
<td>2.2 ± 1.5</td>
<td>0.144</td>
</tr>
<tr>
<td>24</td>
<td>2.0 ± 1.2</td>
<td>3.2 ± 0.9</td>
<td>0.023</td>
</tr>
<tr>
<td>48</td>
<td>1.6 ± 1.0</td>
<td>2.5 ± 1.0</td>
<td>0.038</td>
</tr>
<tr>
<td>0.5</td>
<td>6.9 ± 5.6</td>
<td>7.9 ± 6.2</td>
<td>0.595</td>
</tr>
<tr>
<td>24</td>
<td>9.4 ± 5.7</td>
<td>16.0 ± 9.0</td>
<td>0.031</td>
</tr>
<tr>
<td>48</td>
<td>6.8 ± 5.7</td>
<td>12.0 ± 8.9</td>
<td>0.005</td>
</tr>
</tbody>
</table>
differences between different topical NSAIDs in terms of pain relief and re-epithelialization time. Some papers reported patients with corneal melting after topical NSAID medications especially with diclofenac drops.

The cycloplegics, by relieving ciliary spasm, have a well-established effect on decreasing pain and discomfort in corneal lesions. Our study showed that homatropine has established effect on decreasing pain and discomfort in corneal lesions especially with diclofenac drops.

Patients with corneal melting after topical NSAID medication frequently in studies for evaluating pain discomfort severity, experience. Although VAS and PRI have been used frequently in studies for evaluating pain discomfort severity, Keele’s verbal rating scale for pain has been used scarcely and this enhances the quality of measurements.

In our study the other eye of the patient was considered as control. Evaluation of the pain severity in either eye might be influenced by the pain experience in the other eye. So the pain scores in this study might be different if homatropine and control eyes were selected from different individuals.

In conclusion, this pilot study showed that homatropine is effective for reducing post-PRK pain and discomfort. Cycloplegics are cheap and safe medications without known deleterious effects on wound healing and could be helpful for PRK patients in their early postoperative period. Other cycloplegic drugs with different cycloplegic durations might be effective and more convenient to use. Further studies with a larger sample size are needed to establish the definitive effects of cycloplegics on post-PRK pain.

References

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