Elevation of Intraocular Pressure in Patients With Uveitis Treated With Topical Difluprednate

Difluprednate ophthalmic emulsion, 0.05% (Durezol), is a topical corticosteroid approved for postoperative inflammation. Its efficacy has been demonstrated in several phase 3 clinical studies.1-3 Compared with topical prednisolone acetate, 1%, for the treatment of anterior uveitis, difluprednate, 0.05%, dosed 4 times a day is reported to be as effective as prednisolone acetate, 1%, dosed 8 times a day.1 Each of the phase 3 studies described a small number of patients who developed increased intraocular pressure (IOP) (≥21 mm Hg; ≥10 mm Hg from baseline), without further quantification.2,4 All patients responded to topical IOP-lowering medications.5 We report the occurrence of large elevations in IOP in a cohort of patients receiving difluprednate for uveitis.

Methods. With approval of the institutional review board at the University of Illinois at Chicago, medical records of consecutive patients treated with difluprednate ophthalmic emulsion between November 1, 2008, and October 17, 2010, were reviewed. Collected information included age, race, sex, diagnosis, level of inflammation, and IOP (measured with Goldmann applanation tonometry). The classifications of uveitis and level of inflammation were based on the Standardization of Uveitis Nomenclature criteria.6

Results. A total of 46 eyes of 27 patients were treated with difluprednate for a mean of 16.4 weeks (range, 1-46 weeks). The mean age was 34 years (range, 6-63 years). Uveitis was anterior in 15 patients (56%), intermediate in 1 patient (4%), posterior in 1 patient (4%), and panuveitis in 10 patients (37%). Twenty-six patients had chronic disease. Prior to initiation of difluprednate treatment, 17 patients (63%) were using Pred Forte (prednisolone acetate, 1%), 8 patients (30%) were using generic prednisolone acetate, 1%, and 2 patients (7%) were not using topical steroids. All patients who were originally receiving Pred Forte or generic prednisolone acetate were switched because of persistent anterior chamber (AC) inflammation in at least 1 eye. The numbers of patients who displayed an elevation in IOP greater than or equal to 10, 15, and 20 mm Hg are shown in the Table, as are the numbers of patients who had a peak IOP greater than or equal to 30, 40, or 50 mm Hg.

The mean baseline IOP before difluprednate treatment was 13.4 mm Hg (range, 0-27 mm Hg). An initial increase of at least 5 mm Hg was measured at a mean of 4.9 weeks (range, 1-16 weeks), with a mean time to peak elevation...
of 9.6 weeks (range, 2-30 weeks). Five of the patients were children (aged 6-16 years). An increase in IOP of 15 mm Hg or more was measured in 11 patients (41%)—4 of 5 children and 7 of 22 adults. An increase of 20 mm Hg or more was seen in 2 of 5 children and 3 of 22 adults. The peak IOP was 30 mm Hg or higher in 3 of 5 children and 4 of 22 adults. All IOP increases responded to difluprednate discontinuation or addition of glaucoma medications. No patient required glaucoma surgery.

The mean AC cell grade prior to starting difluprednate treatment was 1.7 on a scale of 0 to 4. Seven eyes (15%) of 7 patients had an AC cell grade of 0 prior to switching to difluprednate treatment. At the peak IOP while receiving difluprednate, a mean reduction in AC cell grade of 1.3 was measured. Twenty-five eyes (54%) had an AC cell grade of 0 when treated with difluprednate.

**Comment.** Difluprednate appears to be an effective topical corticosteroid, but it may cause dramatic elevation of IOP in some patients, particularly children. In this series, IOP increased even in those patients not previously considered to be steroid responders to other topical agents such as prednisolone acetate. It is difficult to compare our results with published data on elevation of IOP reported with other corticosteroid eyedrops. An initial study by Armacost on topical corticosteroids reported a 10-mm Hg IOP increase in 28% of subjects and an increase greater than 15 mm Hg in 5% of subjects. However, these data are from normal control subjects, not patients with uveitis. Data on steroid response in patients with uveitis are limited. One series reported 2 of 18 eyes (11%) with uveitis and an IOP elevation to 30 mm Hg secondary to treatment with betamethasone phosphate, 0.1%, 3 times a day for 6 weeks.

The question arises whether the high IOP seen here represents recovery of ciliary body shutdown with resolution of inflammation. However, more than 70% of the patients in this series had a modest AC reaction (<2+ cells), not typically enough to shut down aqueous production. As well, the IOP response observed here was very rapid and dramatic.

The unpredictable and potentially dramatic IOP response to topical difluprednate demonstrated here mandates the need for close IOP monitoring in patients treated with this agent. Because the IOP elevation was particularly pronounced in children, we stress the need for IOP monitoring of all patients with uveitis, including those in the pediatric age group, at every visit.

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**Table. Proportion of Patients Who Developed a Marked Increase in Intraocular Pressure While Receiving Topical Difluprednate**

<table>
<thead>
<tr>
<th>IOP Measurement</th>
<th>Children</th>
<th>Adults</th>
<th>Total Patients</th>
<th>Eyes (% of Treated Eyes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>4 (80)</td>
<td>10 (45)</td>
<td>14 (52)</td>
<td>18 (39)</td>
</tr>
<tr>
<td>15</td>
<td>4 (80)</td>
<td>7 (32)</td>
<td>11 (41)</td>
<td>13 (28)</td>
</tr>
<tr>
<td>20</td>
<td>2 (40)</td>
<td>3 (14)</td>
<td>5 (19)</td>
<td>6 (13)</td>
</tr>
<tr>
<td>Peak</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>3 (60)</td>
<td>4 (18)</td>
<td>7 (26)</td>
<td>9 (20)</td>
</tr>
<tr>
<td>40</td>
<td>1 (10)</td>
<td>2 (9)</td>
<td>3 (11)</td>
<td>4 (9)</td>
</tr>
<tr>
<td>50</td>
<td>0</td>
<td>1 (5)</td>
<td>1 (4)</td>
<td>1 (2)</td>
</tr>
</tbody>
</table>

Abbreviation: IOP, intraocular pressure.

**Intraocular Pressure Elevation During Radioactive Plaque Brachytherapy for Uveal Melanoma**

**U**veal melanoma is the most common primary intraocular malignant neoplasm in adults, with an average incidence of 6 cases per 1 million people per year. The Collaborative Ocular Melanoma Study has shown that radioactive iodine 125 plaque brachytherapy offers equivalent survival compared with enucleation. While allowing preservation of the eye, brachytherapy has many potential complications, including dry eye, cataract, radiation retinopathy and optic neuropathy, glaucoma, and vision loss. To our knowledge, intraocular pressure (IOP) fluctuation during brachytherapy has not been previously described. The purpose of this investigation was to quantify the IOP changes during brachytherapy. Based on clinical experience, we speculated that the IOP would increase during brachytherapy.


