Intraorbital Injection of Triamcinolone Acetonide in Patients With Idiopathic Orbital Inflammation

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Objective: To present findings of a pilot study on intraorbital corticosteroid therapy in the management of idiopathic orbital inflammation.

Methods: This prospective, noncomparative, interventional case series included patients with clinically, radiologically, and histologically confirmed idiopathic orbital inflammation with an anterior orbital mass. Twenty to 40 mg/mL of triamcinolone acetonide was injected intraorbitally (intralesionally or perilesionally) in all patients. The injection was repeated at 4-week intervals if complete resolution was not achieved. Patients were assessed for local and systemic complications of corticosteroid injection. Visual acuity, fundus examination, intraocular pressure, blood pressure, and serum glucose levels were measured at each visit.

Results: Ten patients (5 men and 5 women; mean age, 49.8 years [age range, 25-82 years]) received treatment. In 4 patients, an orbital mass was noted; in 6 patients, the lacrimal gland was involved (dacryoadenitis). Substantial improvement (1 patient) or complete resolution (8 patients) was noted during a follow-up of 9.8 months (range, 3-24 months).

Conclusion: Intraorbital injection of a corticosteroid is an effective treatment for idiopathic orbital inflammation and may be considered first-line treatment in selected patients.

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DIOPATHIC ORBITAL INFLAMMATION (IOI) refers to benign noninfective inflammatory conditions of the orbit without identifiable local or systemic cause.1 Onset is generally acute or subacute and may be focal (myositis, dacryoadenitis, anterior, or apical) or diffuse. Histopathologic analysis usually reveals a nonspecific, chronic, polymorphic inflammatory infiltrate, but sclerosing and nonspecific granulomatous variants may also be seen.2,3 Though IOI is usually exquisitely sensitive to corticosteroid therapy, a large percentage of patients may not demonstrate this rapid response or may require long-term maintenance therapy,1,4 exposing them to the considerable adverse effects of systemic corticosteroids. Local corticosteroid injections are an attractive alternative, especially because ophthalmologists are familiar with the procedure. While periorcular corticosteroid injections are an established treatment for intraocular inflammation, to our knowledge, there are few reports in the literature about their use in orbital inflammatory conditions.5-8 We describe the successful treatment of biopsy-proved IOI with intraorbital corticosteroid injections.

METHODS

The study group included all patients with clinically, radiologically, and histologically confirmed IOI and an anterior inflammatory mass treated with intraorbital injection of 40 mg/mL of triamcinolone acetonide at the Royal Adelaide Hospital, Adelaide, South Australia, from January 1, 2002, through October 31, 2006. Patients with a blind contralateral eye, glaucoma, ocular hypertension, or bilateral orbital inflammation were excluded from the study. Patients with posteriorly located orbital inflammation were excluded because of the small number of cases (<10% of IOI cases at our center) and because these patients were treated empirically with corticosteroids in the first instance owing to the possible morbidity associated with biopsy. This study was approved by the institutional review board, and all patients gave written informed consent before treatment.

Data collected in the study group included initial clinical signs and symptoms, findings at physical examination and at computed tomography or magnetic resonance imaging, and final outcome. Patients were assessed for local and systemic complications of corticosteroid injection including visual acuity, fundus examination, intraocular pressure, systemic blood pressure, and serum glucose levels. Follow-up examination was performed at 1 and 4 weeks after each orbital corticosteroid injection.
<table>
<thead>
<tr>
<th>Sex/ Age/ Affected Eye</th>
<th>Duration of Symptoms</th>
<th>Signs and Symptoms</th>
<th>Findings at CT or MRI</th>
<th>Histologic Findings</th>
<th>Initial Systemic Treatment</th>
<th>Intraorbital Triamcinolone Acetonide Injection Response</th>
<th>Complications</th>
<th>Duration of Follow-up, mo</th>
</tr>
</thead>
<tbody>
<tr>
<td>M/65/OS 4 mo</td>
<td>Upper eyelid edema, nonaxial proptosis, inferior globe displacement, and restriction in upgaze</td>
<td>Homogeneous superior orbital mass involving the SRM</td>
<td>Nonspecific chronic inflammation</td>
<td>None</td>
<td>First dose: 40 mg; repeated doses: 40 mg at 4 and 8 wk, 20 mg at 12 wk</td>
<td>Improvement at 1 wk; complete resolution at 16 wk</td>
<td>None</td>
<td>12</td>
</tr>
<tr>
<td>F/43/OD (Figure 1) 3 mo</td>
<td>Upper eyelid edema, ptosis, nonaxial proptosis, inferomedial globe displacement, and restriction in upgaze</td>
<td>Homogeneous mass arising from lacrimal gland, extending to SRM</td>
<td>Nonspecific inflammation</td>
<td>None</td>
<td>First dose: 40 mg; repeated doses: 40 mg at 4 and 8 wk</td>
<td>Improvement at 4 wk; complete resolution at 20 wk</td>
<td>None</td>
<td>9</td>
</tr>
<tr>
<td>M/51/OS (Figure 2) 2 mo</td>
<td>Upper eyelid edema, nonaxial proptosis, medial globe displacement, and horizontal gaze restriction</td>
<td>Homogeneous mass involving the LRM, extending posteriorly</td>
<td>Sclerosing inflammation</td>
<td>None</td>
<td>First dose: 40 mg; repeated dose: 20 mg at 4 wk</td>
<td>Improvement at 4 wk; complete resolution at 6 wk</td>
<td>None</td>
<td>18</td>
</tr>
<tr>
<td>M/47/OS 2 wk</td>
<td>Upper eyelid edema, ptosis, medial globe displacement, and superolateral mass</td>
<td>Homogeneous mass arising from lacrimal gland</td>
<td>Sclerosing inflammation</td>
<td>None</td>
<td>Single 40-mg dose</td>
<td>Complete resolution at 4 wk</td>
<td>None</td>
<td>7</td>
</tr>
<tr>
<td>F/25/OS 2 mo</td>
<td>Upper eyelid swelling and erythema, inferomedial globe displacement, and mild restriction in supraduction and abduction</td>
<td>Enlarged lacrimal gland</td>
<td>Nonspecific chronic inflammation</td>
<td>None</td>
<td>Single 20-mg dose</td>
<td>Improvement at 1 wk; complete resolution at 4 wk</td>
<td>None</td>
<td>7</td>
</tr>
<tr>
<td>F/58/OD 2 mo</td>
<td>Upper and lower eyelid swelling medially, lower eyelid mass, axial proptosis, and limited ocular motility on downgaze</td>
<td>Inferomedial orbital mass</td>
<td>Nonspecific granulomatous inflammation</td>
<td>Oral prednisolone; therapy stopped because of cushingoid reaction</td>
<td>First dose: 20 mg; repeated doses: 40 mg at 4 and 8 wk</td>
<td>Improvement at 8 wk; mild diplopia on downgaze</td>
<td>None</td>
<td>24</td>
</tr>
<tr>
<td>M/60/OD 2 mo</td>
<td>Upper eyelid swelling, limited ocular motility on upgaze</td>
<td>Well-defined mass in superior muscle complex, enlarged lacrimal gland</td>
<td>Sclerosing inflammation</td>
<td>Noncompliant with oral prednisolone</td>
<td>Single 40-mg dose</td>
<td>No response</td>
<td>Nausea and vomiting</td>
<td>6</td>
</tr>
<tr>
<td>F/31/OD 2 wk</td>
<td>Lateral upper eyelid swelling and pain</td>
<td>Enlarged lacrimal gland</td>
<td>Nonspecific chronic inflammation</td>
<td>None; patient was pregnant</td>
<td>Single 20-mg dose</td>
<td>Complete resolution at 1 wk</td>
<td>None</td>
<td>6</td>
</tr>
<tr>
<td>F/82/OD 2 mo</td>
<td>Right upper eyelid ptosis and fullness with palpable lacrimal gland on right side</td>
<td>Enlarged lacrimal gland</td>
<td>Nonspecific granulomatous inflammation</td>
<td>None</td>
<td>Single 40-mg dose</td>
<td>Complete resolution at 2 wk</td>
<td>None</td>
<td>6</td>
</tr>
<tr>
<td>M/36/OD 5 mo</td>
<td>Right upper eyelid retraction and diplopia on upgaze</td>
<td>Enlargement of anterior portion of right SRM</td>
<td>Nonspecific chronic inflammation</td>
<td>Noncompliant with oral prednisolone</td>
<td>Single 40-mg dose</td>
<td>Complete resolution at 4 wk</td>
<td>None</td>
<td>3</td>
</tr>
</tbody>
</table>

Abbreviations: CT, computed tomography; LRM, lateral rectus muscle; MRI, magnetic resonance imaging; SRM, superior rectus muscle.
Twenty to 40 mg/mL of triamcinolone acetonide was injected intraorbitally (intralesionally or perilesionally) using a 27- or 25-gauge needle. Follow-up visits were at 1 and 4 weeks. The decision to repeat the injection at 4 weeks was based on the clinical response and signs of an active inflammatory process. If no response was noted 4 weeks after the injection, the treatment was not repeated.

**RESULTS**

The demographic data and clinical characteristics of the 10 patients are given in the Table. There were 5 men and 5 women, with a mean age of 49.8 years (age range, 25-82 years). In most patients, onset of IOI was subacute. Eyelid edema, ptosis, mild proptosis, globe displacement, and impairment of motility were common findings. At imaging, the disease process was found to involve the lacrimal gland in 4 patients, the lacrimal gland and superior rectus muscle in 2 patients (Figure 1), the superior rectus muscle in 2 patients, the lateral rectus muscle in 1 patient (Figure 2), and the inferomedial orbit in 1 patient. Histologic analysis revealed nonspecific, nongranulomatous, chronic inflammation in 5 patients, sclerosing inflammation in 3 patients, and nonspecific granulomatous inflammation in 2 patients.

Intralesional or perilesional triamcinolone acetonide was injected in all 10 patients. Based on clinical findings, repeated injections were given in 4 patients, all of whom demonstrated an excellent response. Five patients had complete resolution of symptoms after a single injection. One patient did not respond to the first injection and refused further treatment. There were no signs of recurrence over a mean follow-up of 9.8 months (range, 3-24 months) in the 9 patients who responded to the corticosteroid injections.

The only complication noted was an isolated episode of nausea and vomiting that developed a few hours following the injection in 1 patient. None of the patients demonstrated increased intraocular pressure or any
systemic complications as a result of corticosteroid treatment. None of the patients had diabetes mellitus.

**COMMENT**

Idiopathic orbital inflammation was treated with intraorbital injection of triamcinolone acetonide in 10 patients in our unit during a 5-year period. Intraorbital injection of corticosteroids (sub-Tenon space or orbital floor injection) is well established in the treatment of intraocular inflammation. Similarly, intralesional injection of corticosteroids has been used to treat periorbital conditions such as capillary hemangioma, chalazia, cutaneous sarcoidosis, and vernal keratoconjunctivitis. Intralesional corticosteroid injections are the most commonly used treatment of periorbital capillary hemangiomas. The use of intraorbital corticosteroid injections to treat orbital diseases, however, has not been widely reported, with only isolated series documenting its use in thyroid ophthalmopathy, orbital xanthogranuloma, dacyroadenitis, and orbital capillary hemangioma. Elner et al treated 6 patients with orbital xanthogranuloma with intraslesional triamcinolone acetonide injection (dose range, 20-120 mg). Local control was obtained in all patients; however, 4 patients required repeated injections (22 injections in 1 patient). Mohammad described a series of 5 patients with acute dacyroadenitis who were treated with intraslesional betamethasone injection (dose range, 14-28 mg). All patients had complete resolution of disease after a single injection, and no recurrence was noted over a minimum follow-up of 8 months.

The use of intraorbital corticosteroid injections in thyroid ophthalmopathy has a long history but does not seem to be widely used. Recently, Ebner et al reported the beneficial effects of periorbital triamcinolone injection in diplopia and extraocular muscle size in 20 patients. In that study, a series of 4 weekly injections of 20 mg of triamcinolone acetonide were given in the inferolateral quadrant of each orbit. No complications were observed. Harris has suggested that intraoperative local injection with triamcinolone is useful, especially in sclerosing inflammation. In our series, 2 of the 3 patients with sclerosing inflammation showed a response to triamcinolone injection.

Triamcinolone acetonide has been most commonly used for periorbital injections, though betamethasone and methylprednisolone have also been used. The elimination rate of these corticosteroid boluses from the injection site has not been well documented, but active corticosteroid has been found 13 months after triamcinolone injection. The dose equivalent between systemic and periorbital corticosteroid is also unknown; though Goldberg has suggested that a 40-mg injection is equivalent to a 20-mg/dose of orally administered prednisone. As with oral corticosteroids, periorbital injections may also need to be repeated several times before the desired therapeutic effect is achieved. However, inasmuch as the injections are not given daily, the total systemic dose is substantially smaller with periorbital corticosteroids.

Although the injection of orbital corticosteroids is usually safe, potential risks include skin depigmentation, methyl cellulose–initiated granuloma, intractable elevated intraocular pressure, ptosis, globe perforation, corneoscleral or conjunctival melting, retinal artery occlusion from embolization or pressure-induced optic nerve compression, proptosis, and fat atrophy. Increased intraocular pressure is a well-recognized adverse effect of periorbital corticosteroid injection and in intractable cases may necessitate surgical removal of the corticosteroid bolus. Ptosis is a complication after injection into the posterior sub-Tenon space but seems to occur exclusively after triamcinolone injection and may reflect the myotoxic effect of this drug. As Goldberg noted, however, most of these complications have been reported after injection into the posterior sub-Tenon space, and it is conceivable that anteriorly placed intraorbital injections would substantially decrease the complication rate.

The most dreaded complication of periorbital corticosteroid injection is central retinal artery occlusion; however, this seems to be a rare complication and is primarily associated with injections into capillary hemangiomas. Systemic effects are uncommon, though adrenal suppression has been reported after periorbital corticosteroid injection. The decreased risk of systemic adverse effects with local injection compared with systemic use makes this a good option in patients who demonstrate a good response to corticosteroid therapy but are intolerant of the systemic adverse effects. Complications may be minimized with attention to the injection technique and use of the smallest volume necessary (≤1 mL of a 40-mg/mL triamcinolone injection). Imaging studies should be used to localize the quadrant of injection, and injection away from the globe into the anterior orbit may minimize complications. At least a 27-gauge needle and preferably a 25-gauge needle should be used because smaller needles offer greater resistance to corticosteroid flow and increase injection pressure. The plunger must be withdrawn before injection as a safeguard against intravascular injection. The corticosteroid should then be injected slowly with the patient’s eyes open to detect any blurring of vision during the treatment. The fundus may be monitored during the injection with indirect ophthalmoscopy or with an immediate postinjection fundus examination.

As with systemic corticosteroid therapy, some patients are resistant to periorbital corticosteroid treatment. In our opinion, it is unlikely that patients with a localized disease process who do not respond to corticosteroid injection will respond to systemic corticosteroid therapy. However, because the dose equivalent between corticosteroid injections and systemic corticosteroid therapy is unknown, a trial of high-dose systemic corticosteroid therapy may be considered before other therapies such as immunosuppressive agents or radiotherapy.

Our findings demonstrate that intraorbital corticosteroid injections may be at least as efficacious as systemic corticosteroid therapy in the treatment of anterior IOI, with minimal systemic adverse effects. Larger studies will be required to further assess the local safety issues with the use of corticosteroid injections in the context of IOI. The risk of local adverse effects perhaps may be mini-
mized by giving close attention to the technique, placing the corticosteroid bolus in the anterior orbit, using a 25-gauge needle, and using the smallest volume necessary of corticosteroid. Biopsy is recommended in all cases to confirm the diagnosis and to exclude malignant neoplasm. A substantial number of patients may require repeated injections to achieve a therapeutic response. Although further investigation is required to delineate the safety profile, intraorbital corticosteroid injections may have a role as first-line therapy in the treatment of anteriorly located IOI and in patients with IOI who are corticosteroid responsive but corticosteroid intolerant.

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Author Contributions: Drs Leibovitch, Prabhakaran, and Selva had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. Study concept and design: Leibovitch and Selva. Acquisition of data: Davis and Selva. Analysis and interpretation of data: Prabhakaran and Selva. Drafting of the manuscript: Leibovitch and Prabhakaran.

Critical revision of the manuscript for important intellectual content: Davis and Selva. Administrative, technical, and material support: Selva. Study supervision: Leibovitch, Davis, and Selva.

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REFERENCES