Trans-Tenon’s retrobulbar triamcinolone infusion for the treatment of uveitis

A A Okada, T Wakabayashi, Y Morimura, S Kawahara, E Kojima, Y Asano, T Hida

PATIENTS AND METHODS

Trans-Tenon’s retrobulbar triamcinolone infusion was performed in 51 consecutive eyes of 37 patients with uveitis (21 women, 16 men) for vitritis (26 eyes), CMO (22 eyes), or retinal vasculitis involving the posterior pole (three eyes), not improving with topical corticosteroids. Patients had the following diagnoses: sarcoidosis, eight patients (11 eyes); Behçet’s disease, eight patients (11 eyes), Vogt-Koyanagi-Harada (VKH) disease, six patients (12 eyes); tuberculous uveitis, three patients (three eyes); serpiginous choroiditis, one patient (two eyes); acute anterior uveitis (AAU), one patient (one eye); sclerouveitis, one patient (one eye); unknown aetiology, nine patients (10 eyes). Seven patients with Behçet’s disease were taking concurrent systemic colchicine and/or cyclosporin. The three patients with tuberculous uveitis were taking concurrent systemic isoniazid and rifampin, started at least 1 month before triamcinolone infusion. Nine other patients (VKH disease, four patients; sarcoidosis, two patients; AAU, one patient; serpiginous choroiditis, one patient; panuveitis of unknown aetiology, one patient) were concurrently receiving systemic corticosteroids and/or cyclosporin. The systemic regimen was either unchanged or in the process of being tapered over the first 3 months after initial triamcinolone infusion in all patients. Median patient age was 55 years (range 19–81 years) and median post-triamcinolone infusion follow up period was 13 months (range 4–29 months). Clinical records were reviewed retrospectively and did not require institutional review board approval.

Informed consent was obtained before each procedure. The patient’s eye was prepared with 0.3125% povidone-iodine and draped in a minor procedure room. A lid speculum was placed after topical instillation of 0.4% oxybuprocaine or 4% Xylocaine. Under a 5x operating microscope, conjunctiva and Tenon’s capsule were incised in the inferotemporal quadrant, approximately 3–4 mm posterior to the limbus using smooth microforceps and conjunctival scissors, just enough to create a small buttonhole opening through to bare sclera. Next, a 23 gauge curved blunt cannula approximately 2.1 cm in length (#HSS-2764, Handaya Co, Ltd, Tokyo, Japan) was introduced through this opening and inserted to the hub. If resistance was met, the cannula was pulled back and reinserted to ensure smooth movement through the plane between Tenon’s capsule and sclera. Once in position, and after confirmation that no fluid entered the syringe upon attempted aspiration, 0.5 ml of 40 mg/ml (total dose 20 mg) triamcinolone acetonide (Bristol Pharmaceutical, KK, Tokyo, Japan) was infused using a 1 ml tuberculin syringe. If any resistance was met during infusion, the cannula was withdrawn slightly and infusion reattempted, allowing for proper infusion without reflux through the wound opening. The procedure was associated with mild discomfort in some patients but no frank pain. At the end of the procedure, the wound was left unsutured and 0.5% levofloxacin was instilled into the eye. The patient was instructed to use 0.5% levofloxacin eye drops three times a day for 1 week.

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Patients were examined by slit lamp biomicroscopy and binocular indirect funduscopy at least once a month after triamcinolone infusion, and efficacy was defined as improvement in severity of the finding within 3 months. Fluorescein angiography (FA) and/or optical coherence tomography (OCT) were performed at the attending physician’s discretion in some but not all eyes. Cataract progression was assessed clinically by slit lamp biomicroscopy throughout the follow up period, and was defined as new or increase in any type of lens opacification after triamcinolone infusion (arbitrary scale 1–4). Intraocular pressure (IOP) elevation was defined as an IOP greater than 22 mm Hg by applanation tonometry. Repeat triamcinolone infusion was considered only in the absence of elevated IOP and in most cases at least 3 months had passed since the previous infusion.

**RESULTS**

The overall efficacy rate after initial trans-Tenon’s retrobulbar triamcinolone infusion was 86% for all 51 eyes (Table 1). Efficacy by funduscopy was 96% for vitritis, 82% for CMO, and 33% for retinal vasculitis. Efficacy in the latter two groups was supported by FA and/or OCT performed in some but not all eyes.

Visual acuity improvement after initial triamcinolone infusion was assessed for those eyes in each group with a pretreatment visual acuity of 0.155 logMAR or worse at the time of initial triamcinolone infusion, and numerator represents eyes that showed improvement. Improvement by funduscopy for vitritis was defined as decrease in the vitreous haze score (published scale 1–5). For cystoid macular oedema (CMO), funduscopic improvement was defined as resolution of intraretinal cysts. For retinal vasculitis, funduscopic improvement was defined as at least 50% decrease in haemorrhages and exudates along inflamed vessels. Improvement by FA for CMO was defined as decreased pooling in late images of the fovea (arbitrary scale 1–4), and for retinal vasculitis as decreased vascular leakage or staining (arbitrary scale 1–4) in late images. Improvement by OCT for CMO was defined as at least 50% decreased height of retinal thickness in the center of the fovea and return of the normal foveal configuration.

### Table 1: Efficacy of trans-Tenon’s retrobulbar triamcinolone infusion in uveitis (numbers are number of eyes [%])

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Efficacy assessed by: funduscopically</th>
<th>FA*</th>
<th>OCT*</th>
<th>Visual acuity improvement†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitritis (n = 26)</td>
<td>25/26 (96)</td>
<td>NA</td>
<td>NA</td>
<td>11/14 (79)</td>
</tr>
<tr>
<td>Cystoid macular oedema (n = 22)</td>
<td>18/22 (82)</td>
<td>4/5 (80)</td>
<td>12/15 (80)</td>
<td>11/16 (69)</td>
</tr>
<tr>
<td>Posterior retinal vasculitis (n = 3)</td>
<td>1/3 (33)</td>
<td>1/1 (100)</td>
<td>NA</td>
<td>0/1 (0)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>44/51 (86)</td>
<td></td>
<td></td>
<td>22/31 (71)</td>
</tr>
</tbody>
</table>

*Denominator represents number of eyes in which the examination was performed both before and within 3 months after initial triamcinolone infusion, and numerator represents eyes that showed improvement. Improvement by funduscopy for vitritis was defined as decrease in the vitreous haze score (published scale 1–5). For cystoid macular oedema (CMO), funduscopic improvement was defined as resolution of intraretinal cysts. For retinal vasculitis, funduscopic improvement was defined as at least 50% decrease in haemorrhages and exudates along inflamed vessels. Improvement by FA for CMO was defined as decreased pooling in late images of the fovea (arbitrary scale 1–4), and for retinal vasculitis as decreased vascular leakage or staining (arbitrary scale 1–4) in late images. Improvement by OCT for CMO was defined as at least 50% decreased height of retinal thickness in the center of the fovea and return of the normal foveal configuration.

†Intraocular pressure elevation was defined as an IOP greater than 22 mm Hg by applanation tonometry.

### Table 2: Rates of cataract progression and intraocular pressure elevation (numbers are number of eyes [%] (n = 51 eyes))

<table>
<thead>
<tr>
<th>Cataract progression*</th>
<th>Total 16 (31)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eyes receiving more than one triamcinolone infusion</td>
<td>9 (18)</td>
</tr>
<tr>
<td>Eyes receiving concomitant corticosteroid eyedrops</td>
<td>14 (27)</td>
</tr>
<tr>
<td>Eyes in patients receiving concomitant oral corticosteroids</td>
<td>2 (4)</td>
</tr>
<tr>
<td>Eyes that underwent cataract surgery</td>
<td>3 (6)</td>
</tr>
</tbody>
</table>

Intraocular pressure elevation†

<table>
<thead>
<tr>
<th>Total 14 (27)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eyes receiving more than one triamcinolone infusion</td>
</tr>
<tr>
<td>Eyes receiving concomitant corticosteroid eyedrops</td>
</tr>
<tr>
<td>Eyes in patients receiving concomitant oral corticosteroids</td>
</tr>
<tr>
<td>Eyes that underwent filtration surgery</td>
</tr>
</tbody>
</table>

* Cataract progression was assessed by slit lamp biomicroscopy throughout the follow up period and was defined as new or increase in any type of lens opacification after triamcinolone infusion (arbitrary scale 1–4).

† Intraocular pressure (IOP) elevation was defined as an IOP greater than 22 mm Hg by applanation tonometry. All eyes with IOP elevation were successfully treated with topical antiglaucoma medications, except for one eye in a patient with Behçet’s disease that eventually underwent filtration surgery.
DISCUSSION

The present study evaluates the results of trans-Tenon’s retrobulbar triamcinolone infusion for uveitic eyes, using a long blunt cannula after incision of conjunctiva and Tenon’s capsule. For comparison, Yoshikawa, et al used posterior sub-Tenon’s injections of 25–50 mg triamcinolone via a 1.9 cm needle in 39 uveitic eyes with CMO and found a two line or greater visual acuity improvement in 56.4% of eyes.1 Helm and Holland reported that posterior sub-Tenon’s injection of 40 mg triamcinolone using a 5/8 inch needle produced a two line or greater visual acuity improvement in 12 of 18 eyes (67%) with CMO associated with intermediate uveitis.2 Tanner et al utilised 40 mg triamcinolone sub-Tenon’s injections via a 5/8 inch needle in 28 eyes for CMO associated with posterior or intermediate uveitis,3 and found a two line increase in visual acuity in 40% of eyes at 12 weeks post-injection and a decrease in the mean vitreous cell score for 18 patients. These reports lack data on efficacy by FA or OCT, and do not evaluate efficacy in vitritis or retinal vasculitis. Furthermore, differences in visual acuity measurement and definition of visual acuity improvement make direct comparison with the present study difficult. However, for uveitic CMO, we believe that our results with trans-Tenon’s retrobulbar infusion are comparable if not better, particularly since only 20 mg of triamcinolone was used. In addition, 80% of CMO eyes that underwent pre-triamcinolone and post-triamcinolone infusion FA or OCT showed objective improvement (Table 1), further supporting the high efficacy rate of this method.

Magnetic resonance imaging (MRI) in eyes receiving preoperative ocular anaesthesia using a technique similar to that in this study shows that drug is reliably deposited into the retrobulbar space.19 A similar retrobulbar location of corticosteroid was documented by B-mode ultrasonography in 15 of 16 eyes given retrobulbar injections for inflammatory CMO.20 In contrast, only 17 of 24 eyes (71%) with inflammatory CMO given a sub-Tenon’s injection of corticosteroid using a 5/8 inch needle were found to have the bolus of medication posterior to the equator by B-mode ultrasonography.21 Of the remaining eyes, six were found to have the drug deposited into the orbit while one eye was found to have the drug deposited in the vicinity of the equator. Ultrasonography and MRI were not used to confirm drug location in the present study. However, since trans-Tenon’s retrobulbar infusion involves visual confirmation of cannula entry into sub-Tenon’s space, we believe that reliable drug placement using this method contributes to a high rate of efficacy.

Trans-Tenon’s retrobulbar infusion in the current study was associated with few complications because of the technique itself. Potential complications may include conjunctival abscess, retrobulbar haemorrhage, orbital cellulitis, and globe perforation. Greater numbers of eyes examined in a prospective manner showed objective improvement (Table 1), further supporting the type of disease being treated (some problems require longer exposure to the corticosteroid effect) and ability of the patient to cooperate with a procedure when deciding between trans-Tenon’s retrobulbar triamcinolone infusion and other techniques for placing corticosteroid in or around the eye.

In summary, this non-randomised, uncontrolled, retrospective study found trans-Tenon’s retrobulbar triamcinolone infusion to be effective in reducing posterior inflammation in uveitis, particularly in eyes with vitritis or CMO. Although cataract progression and IOP elevation were observed, complications associated with sub-Tenon’s injections using needles such as blepharoptosis and globe perforation were not noted. We conclude that trans-Tenon’s retrobulbar triamcinolone infusion may be a safe and effective treatment for posterior inflammation in uveitic eyes.

References

1, 2, 3, 4

There has been much recent interest in the use of intravitreal corticosteroid injections10,11 and intravitreal corticosteroid implants2,14 for the treatment of uveitis. Intravitreal injection of 2 mg triamcinolone was reportedly effective in five of six eyes with uveitic CMO in one study, although one eye required trabeculectomy for persistent IOP elevation.10 A separate study using 4 mg triamcinolone injected intravitreally reported reduced uveitic CMO in six of six eyes, although five eyes developed IOP elevation to 30 mm Hg or greater and two eyes developed cataract.11 One other study reported efficacy in two of two eyes with refractory CMO associated with birdshot retinochoroidopathy using an intravitreal injection of 4 mg triamcinolone.12 Intravitreal implants are still being evaluated in clinical trials. All intravitreal techniques for depositing corticosteroid are inherently associated with risks of intraocular complications because of the injection or implantation technique, not to mention possibly higher rates of cataract progression and IOP elevation. Therefore, we believe it preferable to perform the trans-Tenon’s retrobulbar triamcinolone infusion as described in this study before considering a globe invasive injection or implant of the same or similar corticosteroid in eyes already compromised with uveitis.

However, a clear disadvantage of this triamcinolone infusion technique compared to sub-Tenon’s or periocular injection is that it cannot be performed at the slit lamp or with the patient sitting upright in an examination room. A minor procedure area and post-treatment topical antibiotics are required. Furthermore, compared to intravitreal corticosteroid implants, the corticosteroid effect of the triamcinolone infusion or any periocular or intravitreal injection lasts much shorter, necessitating repeat treatments in some eyes. Such differences need to be considered in tandem with consideration of the type of disease being treated (some problems require longer exposure to the corticosteroid effect) and ability of the patient to cooperate with a procedure when deciding between trans-Tenon’s retrobulbar triamcinolone infusion and other techniques for placing corticosteroid in or around the eye.

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