

Safety of an Intravitreal Injection of Triamcinolone

Results From a Randomized Clinical Trial

Mark C. Gillies, MD, PhD; Judy M. Simpson, PhD; Frank A. Billson, MD; Wei Luo, MD, MPH; Philip Penfold, PhD; William Chua, MD; Paul Mitchell, MD, PhD; Meidong Zhu, MD, PhD; Alex B. L. Hunyor, MD

Objective: To determine the safety of a single intravitreal injection of triamcinolone acetonide (4 mg) in patients with subfoveal choroidal neovascularization caused by age-related macular degeneration.

Methods: A double-masked, placebo-controlled, randomized clinical trial was conducted at a public tertiary referral eye hospital. Patients participating had age-related macular degeneration with evidence of choroidal neovascularization, any part of which was classic; age older than 59 years; and best-corrected visual acuity of 20/200 or better. Eyes were assigned to active study treatment or to placebo. Intraocular pressure and cataract grading were performed every 6 months for 3 years. Adverse events, from mild to vision-threatening or life-threatening, were recorded as procedure-related or corticosteroid-related.

Results: Seventy-five eyes were assigned to study treatment and 76 eyes to placebo. There were no moderate or severe adverse events related to the surgical procedure in either group. Triamcinolone-treated eyes had a significantly increased risk of developing mild or moderate elevation of the intraocular pressure. Topical glaucoma medication reduced intraocular pressure to acceptable levels in all patients. There was significant progression of cataract in the triamcinolone-treated eyes.

Conclusion: Despite a significant adverse event profile, intravitreal triamcinolone is generally well tolerated by the human eye as long as patients are carefully followed up by their surgeon and treated appropriately, when necessary.

Arch Ophthalmol. 2004;122:336-340

PERIOcular AND ORBITAL injections of long-acting corticosteroids have been standard treatments for various inflammatory conditions of the eye for many years.^{1,2} Some authorities have proposed that peribulbar administration of corticosteroids might not be ideal for the treatment of chronic ocular disease, suggesting that their action is partly due to systemic absorption of the drug and that their effective dose lasts only a few days to weeks.³ Intraocular administration of corticosteroids has the potential to give extended doses of a drug at high local concentrations.

The safety of intraocular corticosteroids has yet to be studied systematically in humans. The risks of procedure-related (eg, endophthalmitis and retinal detachment) or corticosteroid-related (cataract and elevated intraocular pressure [IOP]) adverse events need to be balanced against the potential beneficial effects of any treatment.

The Intravitreal Triamcinolone Study is a prospective, single-center, double-

masked, placebo-controlled, randomized clinical trial to test the hypothesis that a single intravitreal injection of triamcinolone acetonide (4 mg) will reduce the risk of severe visual loss in eyes with classic neovascular age-related macular degeneration. Despite angiographic evidence that the treatment significantly inhibited the growth of subretinal neovascular fronds 3 months after injection, it did not reduce the risk of severe visual loss during the first year of the study.⁴ The study also presents a unique opportunity to examine the adverse events associated with the intraocular administration of a corticosteroidal agent.

METHODS

PATIENT ENROLLMENT

Patients were recruited from the retina clinics of the Sydney Eye Hospital, a major public tertiary referral center in New South Wales.

Eligibility criteria included age older than 59 years, neovascular age-related macular degeneration with any classic component that was

From the Save Sight and Eye Health Institute, Department of Clinical Ophthalmology (Drs Gillies, Billson, Luo, Penfold, Chua, Mitchell and Zhu), School of Public Health (Dr Simpson), and Sydney Eye Hospital (Dr Hunyor), University of Sydney, Sydney, New South Wales, Australia. The authors have no relevant financial interest in this article.

unsuitable for argon laser photocoagulation, and best-corrected visual acuity of 20/200 or better tested on a logMAR chart. The trial was conducted before the advent of photodynamic therapy; all patients had declined argon laser treatment for subfoveal neovascularization. Exclusion criteria included other serious eye diseases, including uncontrolled glaucoma or a glaucomatous visual field defect, and a history of using systemic corticosteroids. Patients were enrolled in the study after they provided written, informed consent; standard fundus photographs, including fluorescein angiograms, had been taken; and the treatment allocation had been issued by the independent designated officer in the clinic.

TREATMENT

Intravitreal triamcinolone was injected into the vitreous within 1 week of the baseline angiogram and on the day of the baseline visual acuity measurements. The procedure was performed in the outpatient clinic under aseptic conditions. Eyes were prepared with 1 drop of guttae 0.25% apraclonidine hydrochloride, several drops of guttae 1% amethocaine hydrochloride, and 2 flushes of half-strength povidone-iodine (Betadine). A small amount of 2% lignocaine hydrochloride was then administered subconjunctivally with a 30-gauge needle to the site of the injection, and the IOP was reduced by digital massage. Five minutes later using a 27-gauge needle, 0.1 mL of triamcinolone acetate (Kenacort 40; Bristol-Myers Squibb Australia, Noble Park, Victoria) was injected into the vitreous. A small amount of chloramphenicol ointment was then instilled. The commercially available preparation Kenacort 40 (40 mg/mL of triamcinolone acetate) was constituted as follows: 40 mg of triamcinolone acetonide, 6.9 mg of sodium chloride, 15 mg of benzyl alcohol, 7.5 mg of carmellose sodium, and 0.4 mg of polysorbate 80 per milliliter of drug. At the time of manufacture, the air in the container is replaced by nitrogen. No attempt was made to decant the solution.

DATA COLLECTION AND OUTCOMES

Patients were seen 1, 6, 12, and 26 weeks after treatment and then every 6 months for up to 3 years. At each visit, the IOP was determined and cortical cataracts, nuclear sclerosis, and posterior subcapsular cataracts were graded individually (range, 0 to ≥ 4) using a semiquantitative scale with the aid of photographic standards from the Age-Related Eye Disease Study. Data were entered onto standard data collection forms and transferred to an electronic database by dual data entry. Source data verification was performed by 2 independent study monitors on all patients for eligibility, demographics, and outcome and safety data.

GRADING OF ADVERSE EVENTS

Adverse events were graded as follows: grade 1, mild; grade 2, moderate; and grade 3, severe (vision-threatening or life-threatening). Elevation of IOP was graded according to the level before or after the first line of glaucoma medication had been started, when appropriate (**Table 1**).

STATISTICAL ANALYSIS

Safety data were reviewed by a safety monitoring committee after 50, 80, 110, 140, and 151 eyes had been entered into the study. This committee was instructed to break the randomization code and consider stopping the trial if a highly significant ($P < .01$) difference between the 2 groups in the development of severe adverse events was found. The study was approved

Table 1. Grading of Elevated Intraocular Pressure

| | mm Hg | |
|---------|---------------------------------|---------------------------|
| | Without Treatment | With First-line Treatment |
| Grade 1 | 20 to 34 or >4 above baseline | 20 to 24 |
| Grade 2 | ≥ 35 | ≥ 25 to 40 |
| Grade 3 | ...* | >40 |

*No elevation of intraocular pressure at any level was judged severe if medication had not been instituted.

Table 2. Intravitreal Triamcinolone Study Patients' Baseline Characteristics*

| Characteristic | Triamcinolone Acetonide (n = 75) | Placebo (n = 76) |
|-----------------|----------------------------------|------------------|
| Sex | | |
| Female | 43 (57.3) | 49 (64.5) |
| Male | 32 (42.7) | 27 (35.5) |
| Mean age, y | 76 | 77 |
| Hypertension | 31 (41.3) | 40 (52.6) |
| Smoking history | | |
| Never | 37 (49.3) | 34 (44.7) |
| Previous | 27 (36.0) | 27 (35.5) |
| Current | 11 (14.7) | 15 (19.7) |

*Data are given as number (percentage) unless otherwise indicated.

by the human ethics committees of the University of Sydney and the South Eastern Sydney Area Health Service (Eastern Section).

Data were analyzed on the basis of intention to treat. The numbers of adverse events in the treated and control groups were compared using Fisher exact test or the exact test for trend in proportions in SAS version 8 (SAS Institute Inc, Cary, NC). The mean IOP was plotted against time for the 2 groups and compared using a 2-sided *t* test when it peaked in the triamcinolone group. No allowance was made in the analysis for possible correlation between paired eyes of the same individual, as only 12 patients had both eyes treated in the trial.

RESULTS

One hundred fifty-one eyes of 139 patients were entered into the study from November 4, 1996, to June 29, 1999. All patients were white. Seventy-five eyes were treated with triamcinolone and 76 with placebo. Data in this report include observations made until 44 months after the entry of the first patient. One hundred forty-two eyes (94.0%) were available for analysis at 12 months, 100 (66.2%) at 2 years, and 35 (23.2%) at 3 years. Baseline patient demographic data are shown in **Table 2**. The 2 groups of patients were similar, with a slight preponderance of patients in the placebo-treated group being female and having a history of systemic hypertension. **Figure 1** shows the flow of patients through the study.

PROCEDURE-RELATED ADVERSE EVENTS

Procedure-related adverse events are shown in **Table 3**. There were no severe or moderate adverse events in treated

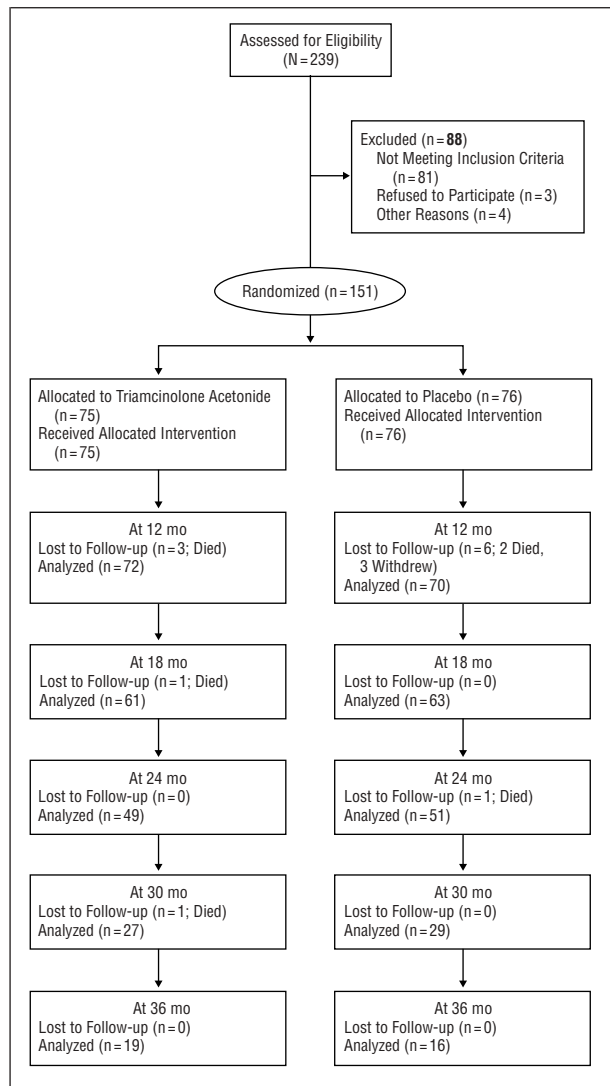


Figure 1. Study flowchart.

or control eyes related to the intraocular or periocular injection. A few patients in both groups reported low-grade symptoms associated with the injection, such as transient discomfort or blurring.

ELEVATED IOP

Corticosteroid-related adverse events are shown in Table 3. Treated eyes had a significantly increased risk of developing mild or moderate elevation of the IOP.

Elevated IOP was adequately treated with topical medication in all eyes, without recourse to laser or surgical treatment. In particular, all eyes with IOPs greater than 25 to 40 mm Hg during treatment were receiving only 1 medication. The pressure was quickly normalized (<25 mm Hg in eyes without cupped discs and <18 mm Hg in eyes with preexisting glaucoma) in all eyes by the addition of further medications, as appropriate. The decision to treat elevated IOP was based on conventional considerations in each patient, including the degree of elevation, the extent of cupping of the optic nerve head, and whether there was a history or

Table 3. Adverse Events Related and Unrelated to Treatment With Triamcinolone Acetonide

| Adverse Event | Triamcinolone (n = 75) | Placebo (n = 76) | P Value* |
|---|------------------------|------------------|----------|
| Procedure-related | | | |
| None | 70 | 73 | .49 |
| Mild | 5 | 3 | |
| Moderate | 0 | 0 | |
| Severe | 0 | 0 | |
| Steroid-related intraocular pressure rise | | | |
| None | 43 | 73 | <.001 |
| Mild | 21 | 3 | |
| Moderate | 9 | 0 | |
| Severe | 2 | 0 | |
| Glaucoma medication | 21 | 1 | <.001 |
| Cataract surgery (if follow-up ≥12 mo) | | | |
| Yes | 16 | 2 | .003 |
| No | 40 | 38 | |
| Other adverse events | | | |
| Moderate (hemiretinal vein occlusion) | 1 | 0 | .62 |
| Severe† | 1 | 3 | |

*Exact test for trend in proportions or Fisher exact test.

†See last paragraph of the "Results" section for details.

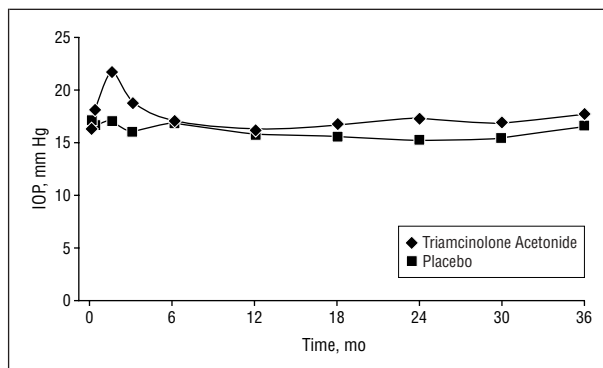


Figure 2. Intraocular pressure (IOP) change in intravitreal triamcinolone study patients.

family history of glaucoma. Twenty-one (28.0%) of 75 eyes receiving triamcinolone required treatment with topical glaucoma therapy to control elevated IOP, compared with 1 (1.3%) of 76 placebo-treated eyes ($P<.001$). A single medication was sufficient in 18 (85.7%) of these eyes, while the other 3 (14.3%) required 2 medications. This treatment was discontinued in 15 (71.4%) of 21 eyes receiving triamcinolone after a mean of 8 months (range, 1.5-32 months). Treatment was discontinued in 11 (52.4%) of 21 eyes at the 6-month posttreatment visit. Six (8.0%) of 75 eyes that were not receiving glaucoma medication at entry into the study continued receiving glaucoma medication at the last study visit.

Figure 2 shows the mean IOP during the study for treated and control eyes. A significant elevation in treated eyes was found at 6 weeks (21.8 vs 17.1 mm Hg, $P=.03$). The curves converged during the rest of the study as affected eyes were prescribed topical medication.

CATARACT

Treated eyes had a significantly increased risk of moderate progression of cataract. **Table 4** shows the proportion of eyes in the treated and control groups that developed progression by 2 or more grades on the Age-Related Eye Disease Study semiquantitative scale for nuclear, cortical, and posterior subcapsular lens opacities during the study. There was significant progression of cataract in the triamcinolone-treated eyes. By the 24-month visit, 8 (24.2%) of 33 triamcinolone-treated eyes had progression by 2 or more Age-Related Eye Disease Study grades (5 progressed by 2 grades, and 3 by 3 grades) compared with 0 of 22 placebo-treated eyes ($P=.02$). Cataract surgery was performed in 16 (28.6%) of 56 treated eyes of patients who completed at least the 12-month study visit vs 2 (5.0%) of 40 eyes receiving placebo ($P=.003$). Cataract surgery was performed at a mean of 25 months (range, 12-34 months) after treatment. The decision to recommend cataract surgery was based on conventional considerations, including the density of the opacification, the level of visual acuity in the fellow eye, and the patient's willingness to undergo surgery.

OTHER ADVERSE EVENTS

One eye treated with triamcinolone developed a hemiretinal vein occlusion 2 months after entry into the study. The IOP at the preceding clinical visit was 16 mm Hg. Visual acuity (20/200) was not affected. This adverse event was judged to be possibly related to treatment with triamcinolone.

Severe adverse events thought to be unrelated to treatment occurred in 1 eye receiving triamcinolone and in 3 control eyes ($P=.62$). The eye receiving triamcinolone developed presumed arteritic anterior ischemic optic neuropathy 6 months after treatment. Elevation of the erythrocyte sedimentation rate and C-reactive protein was detected, but results of a temporal artery biopsy were negative. Three control eyes developed massive subretinal or breakthrough vitreous hemorrhage 1, 3, and 26 weeks following treatment.

COMMENT

The results of this study indicate that a single 4-mg injection of triamcinolone acetonide appears to have an acceptable adverse effect profile in older human eyes. Some mild adverse events were associated with the surgical procedure of intravitreal injection in the 75 eyes treated. A significant incidence of corticosteroid-related adverse events was found, including moderate elevation of the IOP and the development of cataract requiring surgery. All eyes with elevated IOP were adequately controlled with topical therapy alone. Surgery for corticosteroid-induced cataract was undertaken, when appropriate. The safety monitoring committee was satisfied that all adverse events were adequately managed.

Few data exist on the complications of intravitreal injection of corticosteroids in human eyes. In a series of 28 eyes receiving triamcinolone, severely elevated IOP in 4 eyes was reported, but these had received a second injection within 4 months of the first.⁵ A brief report of 113 eyes re-

Table 4. Progression of Cataract by 2 or More Age-Related Eye Disease Study Grades*

| | 12 mo | | 24 mo | |
|--------------------------------|----------------------------------|------------------|----------------------------------|------------------|
| | Triamcinolone Acetonide (n = 56) | Placebo (n = 40) | Triamcinolone Acetonide (n = 33) | Placebo (n = 22) |
| Nuclear sclerosis | 2 (3.6) | 2 (5.0) | 3 (9.1) | 1 (4.5) |
| Cortical cataract | 3 (5.4) | 3 (7.5) | 4 (12.1) | 2 (9.1) |
| Posterior subcapsular cataract | 5 (8.9) | 1 (2.5) | 8 (24.2)† | 0 |

*Data are given as number (percentage).

† $P=.02$.

ceiving a single 4-mg injection of triamcinolone acetonide found elevation of the IOP by 5 mm Hg or higher in 32% of eyes 3 months after treatment.⁶ In 6 eyes that received intravitreal triamcinolone for cystoid macular edema in uveitis, 5 developed elevated IOP and 2 developed cataract.⁷

We tried to define a grading system for the severity of the IOP rise that would be relevant to clinical practice. A system that only considered the degree of IOP rise without treatment might be unnecessarily severe, because a very high pressure rise is not necessarily a severe adverse event if it responds satisfactorily to treatment. On the other hand, a system that only included the degree of IOP elevation after full treatment might have the reverse effect. In the present study, all IOP rises were adequately treated with topical therapy. We chose to examine the IOP level before treatment and after the first-line glaucoma medication had been introduced. It might be alleged that an IOP in the high 30s after institution of first-line therapy is a severe adverse event rather than moderate, but this should be viewed in the context of a regimen of careful postinjection follow-up, in which patients are checked regularly for adverse events, such as elevated IOP, which was treated adequately in all cases with topical medication.

A peculiar condition known as noninfectious endophthalmitis has been described in eyes receiving triamcinolone.⁸ There were no such events in eyes treated in the present study.

A particular strength of this study is that the data were collected in a masked, standardized fashion from eyes treated in a randomized clinical trial, with an equally sized group of untreated eyes, which provides a control against the development of events, such as cataract or breakthrough vitreous hemorrhage, that might occur even without corticosteroid treatment. We were conscious that masking would be an issue in a study such as this. Consequently, the observations of changes in the anterior segment of the eye that constitute most of the data in the present study were made and recorded before examination of the posterior segment, when it might have been possible for the observer to detect whether the patient had been treated with triamcinolone or not. It should be noted that the study is not large, having only a limited power to exclude any serious adverse event that occurred in a small but significant proportion of treated eyes.

The duration of the IOP rise, when it occurred, provides some indication of how long a single 4-mg dose of triamcinolone acetonide persists in the eye at a signifi-

cant concentration. Studies^{9,10} in rabbit eyes have found that triamcinolone persists in the vitreous for 3 to 6 weeks after it has been injected. Pharmacologically active triamcinolone was, however, identified up to 13 months after subconjunctival administration in humans, when it was excised for persistent elevation of the IOP that could not be controlled with topical medication.¹¹ The pressure returned to normal within 1 week in 6 of 7 patients. Mills et al¹² reported 2 similar patients in whom ocular hypertension promptly resolved after the subconjunctival triamcinolone was excised 6½ and 10 months after it had been injected. In the present study, the mean duration of treatment of the corticosteroid-induced elevation of IOP was 8 months, suggesting that the elevated IOP persisted for at least 6 months in most eyes. These data suggest that a single intravitreal injection of 4 mg of triamcinolone acetate may persist in the human eye in significant concentrations for around 3 to 4 months.

The periorbital administration of long-acting corticosteroids is also associated with a significant incidence of adverse effects. Adverse events associated with the treatment of intermediate uveitis with triamcinolone injected into the posterior sub-Tenon space, which is thought to be the safest route of delivery,^{13,14} were reported by Helm and Holland.¹⁵ They reported development of significant cataract in 4 (36.4%) of 11 phakic eyes 10 months to 4 years after treatment. They also found significant elevation of the IOP (median, 32 mm Hg; range, 25-40 mm Hg) in 6 (30.0%) of all 20 eyes studied. In the present study, 16 (28.6%) of 56 patients receiving triamcinolone underwent cataract surgery, and 28% required glaucoma medication. It would appear, therefore, that the risk of adverse events after an intravitreal injection of triamcinolone is similar to that associated with an orbital injection. Some adverse events are particularly related to periocular injection and would not be expected to occur after intraocular injection. These include embolic retinal artery occlusion and accidental penetration or perforation of the globe.¹⁶⁻¹⁹

The findings from our study neither advocate nor support the use of intravitreal corticosteroids for the treatment of retinal neovascularization or any other condition. Intravitreal triamcinolone has been studied in animals for retinal neovascularization and proliferative vitreoretinopathy.¹⁹⁻²³ Several case reports or small case series have recently appeared concerning the clinical use of intravitreal triamcinolone for macular edema in uveitis,^{7,24,25} diabetic macular edema,²⁶ and proliferative vitreoretinopathy.²⁷ The use of intraocular corticosteroids in these and other conditions should be guided by the results of appropriate clinical trials as they are reported and discussed. Intraocular delivery of corticosteroids appears to be safe and has the potential to be more efficacious and sustained than other routes of administration.

Submitted for publication August 15, 2002; final revision received July 30, 2003; accepted August 19, 2003.

This study was funded by grant 974052 from the National Health and Medical Research Council, Canberra, Australia, and the Sydney Eye Hospital Foundation.

Members of the safety monitoring committee were Dr Simpson (chair), Jeremy Smith, FRANZCO, Justin Playfair, FRANZCO, and Paul Power, MS.

Corresponding author: Mark C. Gillies, MD, PhD, Save Sight and Eye Health Institute, Department of Clinical Ophthalmology, Sydney Eye Hospital, University of Sydney, GPO Box 4337, Sydney, New South Wales, Australia 2001 (e-mail: mark@eye.usyd.edu.au).

REFERENCES

1. Coles RS, Krohn DL, Breslin H, Braunstein R. Depo-Medrol in treatment of inflammatory diseases of the anterior segment of the eye. *Am J Ophthalmol.* 1962; 54:407-411.
2. Sturman RM, Laval J, Sturman MF. Subconjunctival triamcinolone acetonide. *Am J Ophthalmol.* 1966;61:155-166.
3. McCluskey P, Forrester J, Lightman S. Unilateral macular oedema and reduced vision in a patient with uveitis. *Clin Experiment Ophthalmol.* 2000;28:9-12.
4. Gillies MC, Simpson JM, Luo W, et al. A randomized clinical trial of a single dose of triamcinolone acetonide for neovascular age-related macular degeneration: one-year results. *Arch Ophthalmol.* 2003;121:667-673.
5. Penfold PL, Gyory JF, Hunyor AB, Billson FA. Exudative macular degeneration and triamcinolone: a pilot study. *Aust N Z J Ophthalmol.* 1995;23:293-298.
6. Wingate RJ, Beaumont PE. Intravitreal triamcinolone and elevated intraocular pressure. *Aust N Z J Ophthalmol.* 1999;27:431-432.
7. Young S, Larkin G, Branley M, Lightman S. Safety and efficacy of intravitreal triamcinolone for cystoid macular oedema in uveitis. *Clin Experiment Ophthalmol.* 2001;29:2-6.
8. Sutter FK, Gillies MC. Pseudo-endophthalmitis after intravitreal injection of triamcinolone. *Br J Ophthalmol.* 2003;87:972-974.
9. Scholes GN, O'Brien WJ, Abrams GW, Kubicek MF. Clearance of triamcinolone from vitreous. *Arch Ophthalmol.* 1985;103:1567-1569.
10. Schindler RH, Chandler D, Thresher R, Machermer R. The clearance of intravitreal triamcinolone acetonide. *Am J Ophthalmol.* 1982;93:415-417.
11. Kalina PH, Erie JC, Rosenbaum L. Biochemical quantification of triamcinolone in subconjunctival depots. *Arch Ophthalmol.* 1995;113:867-869.
12. Mills DW, Siebert LF, Climenhaga DB. Depot triamcinolone-induced glaucoma. *Can J Ophthalmol.* 1986;21:150-152.
13. Mueller AJ, Jian G, Banker AS, Rahhal FM, Capparelli E, Freeman WR. The effect of deep posterior subtenon injection of corticosteroids on intraocular pressure. *Am J Ophthalmol.* 1998;125:158-163.
14. Herschler J. Increased intraocular pressure induced by repository corticosteroids. *Am J Ophthalmol.* 1976;82:90-93.
15. Helm CJ, Holland GN. The effects of posterior subtenon injection of triamcinolone. *Am J Ophthalmol.* 1995;120:55-64.
16. Morgan CM, Schatz H, Vine AK, et al. Ocular complications associated with retrolbulbar injections. *Ophthalmology.* 1988;95:660-665.
17. Ellis PP. Occlusion of the central retinal artery after retrolbulbar corticosteroid injection. *Am J Ophthalmol.* 1978;85:352-356.
18. Giles CL. Bulbar perforation during periocular injection of corticosteroids. *Am J Ophthalmol.* 1974;77:438-441.
19. Yang CS, Khawly JA, Hainsworth DP, et al. An intravitreal sustained-release triamcinolone and 5-fluorouracil codrug in the treatment of experimental proliferative vitreoretinopathy. *Arch Ophthalmol.* 1998;116:69-77.
20. Danis RP, Bingaman DP, Yang Y, Ladd B. Inhibition of preretinal and optic nerve head neovascularization in pigs by intravitreal triamcinolone acetonide. *Ophthalmology.* 1996;103:2099-2104.
21. Antoszyk AN, Gottlieb JL, Machermer R, Hatchell DL. The effects of intravitreal triamcinolone acetonide on experimental pre-retinal neovascularization. *Graefes Arch Clin Exp Ophthalmol.* 1993;231:34-40.
22. Chandler DB, Hida T, Sheta S, Proia AD, Machermer R. Improvement in efficacy of corticosteroid therapy in an animal model of proliferative vitreoretinopathy by pretreatment. *Graefes Arch Clin Exp Ophthalmol.* 1987;225:259-265.
23. Ciulla TA, Criswell MH, Danis RP, Hill TE. Intravitreal triamcinolone acetonide inhibits choroidal neovascularization in a laser-treated rat model. *Arch Ophthalmol.* 2001;119:399-404.
24. Antcliff RJ, Spalton DJ, Stanford MR, Graham EM, Flytche TJ, Marshall J. Intravitreal triamcinolone for uveitic cystoid macular edema: an optical coherence tomography study. *Ophthalmology.* 2001;108:765-772.
25. Martidis A, Duker JS, Puliafito CA. Intravitreal triamcinolone for refractory cystoid macular edema secondary to birdshot retinochoroidopathy. *Arch Ophthalmol.* 2001;119:1380-1383.
26. Jonas JB, Sofker A. Intraocular injection of crystalline cortisone as adjunctive treatment of diabetic macular edema. *Am J Ophthalmol.* 2001;132:425-427.
27. Jonas JB, Hayler JK, Sofker A, Panda-Jonas S. Intravitreal injection of crystalline cortisone as adjunctive treatment of proliferative diabetic retinopathy. *Am J Ophthalmol.* 2001;131:468-471.