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# Frequency of cataract surgery after intravitreal injection of high-dosage triamcinolone acetonide

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PURPOSE. To evaluate the frequency of cataract surgery after intravitreal injection of high-dosage triamcinolone acetonide in elderly patients.
METHODS. This clinical interventional case series study included 144 phakic eyes that consecutively received an intravitreal injection of about 20 mg triamcinolone acetonide for diffuse diabetic macular edema (n=42 eyes), exudative age-related macular degeneration (n=98), and branch retinal vein occlusion (n=4). Mean age was 72.3±8.9 years. Mean follow-up was 11.0±6.8 months (median, 8.8 months; range, 3 to 35.5 months). Reinjections were carried out in 12 (8.3%) eyes.
RESULTS. Cataract surgery was performed in 20 (13.9%) eyes 17.4±9.1 months (median, 12.7 months; range, 8.0 to 35.5 months) after the first intravitreal injection. Out of the 20 eyes undergoing cataract surgery, 19 (95%) eyes had received one intravitreal injection, and 1 (5%) eye had received two previous injections.
CONCLUSIONS. In the elderly population of patients with exudative age-related macular degeneration, diffuse diabetic macular edema, or branch retinal vein occlusion, intravitreal high-dosage injection of triamcinolone acetonide leads to clinically significant cataract with eventual cataract surgery in about 15% to 20% of eyes within about 1 year after the intravitreal injection. (Eur J Ophthalmol 2005; 15: 462-4)

KEY WORDS. Intravitreal triamcinolone acetonide, Cataract, Age-related macular degeneration, Diabetic macular edema, Branch retinal vein occlusion

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## INTRODUCTION

During the last 2 years, intravitreal triamcinolone acetonide has increasingly been used for local treatment of retinal diseases, such as diffuse diabetic macular edema, exudative age-related macular degeneration, central and branch retinal vein occlusion, and other edematous or proliferative diseases of the retina (1-3). Side effects so far reported to occur in association with the intravitreal application of triamcinolone acetonide are secondary ocular hypertension and infectious or noninfectious endophthalmitis (4, 5). In view of the known steroid associated cataractogenic effect, it was the purpose of the present study to evaluate the effect of intravitreal triamcinolone acetonide on the progression of cataract. As clinical outcome measure we chose the frequency of cataract surgery performed after intravitreal injection of triamcinolone acetonide.

## METHODS

This clinical interventional case series study included 144 phakic eyes that consecutively received an intravitreal injection of about 20 mg triamcinolone ace-

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tonide for treatment of diffuse diabetic macular edema (n=42 eyes), exudative age-related macular degeneration (n=98), and branch retinal vein occlusion (n=4). Mean age was 72.3±8.9 years (median, 74.7 years; range, 49.5 to 100.1 years). Mean refractive error was 1.00±1.91 diopters (median, 1.0 diopters; range, –7.0 to 5.9 diopters). Mean follow-up was 11.0±6.8 months (median, 8.8 months; range, 3 to 35.5 months). Reinjections were performed in 12 eyes with diffuse diabetic macular edema (n=2), exudative age-related macular degeneration (n=8), and branch retinal vein occlusion (n=2). The second injection was carried out 7.2±3.7 months (median, 7.2 months; range, 3.9 to 18.0 months) after the first injection. One eye received a third injection for branch retinal vein occlusion 4.4 months after the second injection. All patients were fully informed about the experimental character of the treatment. All patients had signed an informed consent. The Ethics Committee of the University had approved the study, which followed the tenets of the Declaration of Helsinki. Cataract surgery was generally performed if the opacification of the lens was estimated to be sufficiently dense to be a clinically significant although not necessarily a major factor for reduction of vision.

## RESULTS

Cataract surgery was performed in 20 (13.9%) eyes 17.4±9.1 months (median, 12.7 months; range, 8.0 to 35.5 months) after the first intravitreal injection. Out of the 20 eyes undergoing cataract surgery, 19 (95%) eyes had received one intravitreal injection, and 1 (5%) eye had received two previous injections. Including only eyes with a minimal follow-up of 6 months, the percentage of eyes undergoing cataract surgery increased to 20/103 or 19.4%. For the remaining eyes, cataract was not diagnosed to be a clinically significant factor for reduction of visual acuity. The cumulative frequency of cataract surgery increased significantly ($p<0.001$) with increasing follow-up.

## DISCUSSION

The results suggest that in the elderly population of patients with exudative age-related macular degeneration, diffuse diabetic macular edema, or branch retinal vein occlusion, intravitreal high-dosage injections of triamcinolone acetonide may lead to clinically significant cataract with eventual cataract surgery in about 15% to 20% of eyes within about 1 to 1.5 years. Although a frequency of cataract surgery of about 20% per year is higher than the normal rate of cataract surgery in that age group, the results of the present study may show that the intravitreal injection of triamcinolone acetonide does not automatically lead to a cataract surgery within 1 year after the injection, not even if the high dosage of about 20 mg triamcinolone acetonide was used.

There are limitations of the study. The most important limitations are the retrospective study design and that the clarity of the lens was not graded in a masked fashion using an objective scale, such as the LOCS II or LOCS III scale (6, 7). Additionally, it may be that patients who developed progressive lens changes did not undergo cataract surgery because the referring ophthalmologist did not believe that the lens opacification was the primary cause of decreased visual acuity. All patients, however, were re-examined during the follow-up in the same department in which the intravitreal injection of triamcinolone acetonide was performed. In that location, cataract surgery usually was performed in patients with advanced macular diseases if the cataract was a contributing, and not necessarily the major, factor for decreased visual acuity. The results of the study fit with a preceding investigation in which the rate of surgical complications during and after cataract surgery after an intravitreal injection of the high dosage of triamcinolone acetonide was evaluated (8). The results of the present study may also be comparable with a recent investigation by Gillies and coworkers, who investigated the association between elevated intraocular pressure and accelerated cataract formation in patients treated with 4 mg intravitreal triamcinolone (9). In a randomized, double-masked, placebo-controlled trial of intravitreal triamcinolone for age-related macular degeneration, 57 phakic eyes in the treatment group and 54 phakic eyes in the control group were examined. Progression of posterior subcapsular cataract was graded using photographic standards from the Age Related Eye Disease Study (10). Progression of posterior subcapsular cataract by 2 or more grades in the treatment group was significantly higher among 16 eyes with triamcinolone acetonide induced eleva-

tion of intraocular pressure (IOP responders) (51% after 2 years) than among 37 nonresponders (3%; p<0.0001). Progression of cortical cataracts also was significantly higher among responders than nonresponders (15% versus 3%; p=0.015). The progression of nuclear cataracts (13% versus 3%) was not significantly different between IOP responders and nonresponders (p=0.3).

In conclusion, based on the results of the present pilot study one may infer that in patients aged 70 to 80 years, intravitreal high-dosage injections of triamcinolone acetonide lead to clinically significant cataract with eventual cataract surgery in about 15% to 20% of patients within about 1 to 1.5 years after the injection. The cataractogenic side effect of intravitreal triamcinolone acetonide therefore must be considered when counseling patients about the effect and side effects of intravitreal triamcinolone acetonide. In view of the relatively low complication rate of cataract surgery after the intravitreal injection of triamcinolone acetonide, however, the cataractogenic side effect of triamcinolone acetonide may not be a contraindication against the intravitreal injection (8).

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