Intravitreal Injection of Triamcinolone Acetonide

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Core Messages

- Intravitreal triamcinolone acetonide may offer a possible adjunctive treatment for intraocular edematous and neovascular disorders
- The best response after intravitreal triamcinolone acetonide injection in terms of gain in visual acuity was obtained for eyes with intraretinal edematous diseases such as diffuse diabetic macular edema, branch retinal vein occlusion, central retinal vein occlusion, and pseudophakic cystoid macular edema
- Visual acuity increased and degree of intraocular inflammation decreased in eyes with various types of non-infectious uveitis including sympathetic ophthalmia
- Intravitreal triamcinolone may be useful as angiostatic therapy in eyes with iris neovascularization and proliferative ischaemic retinopathies
- Intravitreal triamcinolone may possibly be helpful for exudative age-related macular degeneration, alone or in combination with photodynamic therapy
- In eyes with chronic, therapy resistant, ocular hypotony, intravitreal triamcinolone can induce an increase in intraocular pressure and may stabilize the eye
- Complications of intravitreal triamcinolone therapy include secondary ocular hypertension in about 40 % of the eyes injected, cataractogenesis, postoperative infectious and non-infectious endophthalmitis, and pseudo-endophthalmitis
- Intravitreal triamcinolone injection can be combined with other intraocular surgeries including cataract surgery
- Cataract surgery performed some months after the injection did not show a markedly elevated rate of complications
- If vision increases after the intravitreal triamcinolone injection, the injection may be repeated
- The duration of the effect of a single intravitreal injection of about 20 mg triamcinolone acetonide ranges between 2 and 9 months

9.1 Introduction

The introduction of pars plana vitrectomy in clinical ophthalmology by Robert Machemer and colleagues was a profound paradigm change which opened up new avenues for the treatment of ocular diseases, such as proliferative vitreoretinopathy, which up to that time had been incurable [79]. It was again Robert Machemer who together with Yasuo Tano, Gholam Peyman, Stephan Ryan and other researchers fur-

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ther extended the role the vitreous, and particularly the vitreous cavity, may play in the treatment of intraocular diseases. Considering the vitreous cavity as a drug reservoir, Machemer and others started to inject triamcinolone acetonide intravitreally, so that intraocular diseases became locally treatable, like a skin scratch being treated by ointment. In a first attempt, Peyman, Machemer and colleagues suggested the intravitreal application of steroids to reduce the proliferation of cells, particularly in patients with aggressive proliferative vitreoretinopathy and infectious endophthalmitis [4, 21, 33, 39, 80, 81, 87, 111, 112, 118, 119]. Crystalline triamcinolone acetonide instead of soluble steroids was taken, since soluble cortisone is washed out of the eye within approximately 24 h after a single intravitreal injection [111, 112].

Intravitreal triamcinolone acetonide has a considerably longer absorption time than intravitreal soluble cortisone [6, 42, 43, 45, 73, 80]. The intravitreal application of drugs allows extremely high concentrations of the drug at its site of acquired action, and simultaneously decreases or avoids systemic side effects [26]. Based on the studies by Machemer and others, the intraocular diseases for which intravitreal triamcinolone acetonide has been applied so far include disorders associated with an abnormal proliferation of cells and diseases associated with intraretinal and subretinal edema. Examples are proliferative diabetic retinopathy [54, 64], diabetic macular edema [50, 84, 65, 85], exudative age-related macular degeneration [15, 24, 31, 57, 66, 69, 71, 76, 95, 96, 102, 104, 115], presumed ocular histoplasmosis syndrome [38], central retinal vein occlusion [13, 34, 38, 56, 93], branch retinal vein occlusion [17, 72], neovascular glaucoma with or without cataract surgery [51, 55, 61], proliferative vitreoretinopathy [29, 52, 67], chronic pre-phthisical ocular hypotony [53, 106], chronic uveitis [3, 8, 11, 25, 83, 114, 123], persistent pseudophakic cystoid macular oedema [7, 22, 59, 77], perifoveal telangiectasias [1, 82], sympathetic ophthalmia [47], ischaemic ophthalmopathy [60], immunologic corneal graft reaction [44], extensive exudative retinal detachment [46], radiation induced macular oedema [116], and other disorders such as cystoid macular oedema due to retinitis pigmentosa [110], endocrine orbitopathy [101], Vogt-Koyanagi-Harada syndrome [2] and others [37, 90, 113]. It has also been applied in combination with intraocular surgery to visualize the vitreous and for other purposes [12, 86, 100, 109].

The effect of intravitreal triamcinolone acetonide may be differentiated into a mainly anti-edematous effect and a possibly antiangiogenic effect.

9.2 Anti-edematous Effect of Intravitreal Triamcinolone Acetonide

9.2.1 Diabetic Macular Edema

Recent studies have suggested that intravitreal triamcinolone acetonide may be useful to increase visual acuity in patients with diffuse diabetic macular edema [50, 64, 65, 84, 85]. The patients of a study group receiving intravitreal triamcinolone acetonide compared with patients of control groups without intravitreal injections of triamcinolone acetonide showed a significant increase in visual acuity during the follow-up. Using a dosage of about 20 mg triamcinolone acetonide, the increase in visual acuity was most marked for the first 3–6 months after the injection, and was observable for a period of about 6–9 months [73]. Using a dosage of 4 mg triamcinolone acetonide, the duration of a reduction in the macular thickness as measured by opti-