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CASE SERIES

Improved visual acuity and macular thickness 1 week after intravitreal triamcinolone for diabetic macular oedema

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Abstract

Purpose **To evaluate the clinical and volumetric improvement 1 week after an injection of intravitreal triamcinolone acetonide in eyes with diabetic macular oedema.**

Methods **Seven phakic eyes of seven diabetic patients diagnosed with clinically significant macular oedema were treated with a single 4-mg intravitreal injection of triamcinolone acetonide (0.1 ml). LogMAR best corrected visual acuity (logMAR BCVA), best corrected reading ability (RA), and central macular thickness (CMT) with optical coherence tomography (OCT) were assessed prior and 1 week subsequent to treatment.**

Results **Mean improvement in logMAR BCVA was 0.146 ($P = 0.03$). Mean reduction in CMT was 150.9 μm ($P = 0.02$, Wilcoxon signed-rank test). Mean improvement in RA was 3 lines.**

Conclusion **Reduction in macular oedema was demonstrated on OCT at 1 week, in most cases associated with improvement in central visual function, in particular, reading ability. Total resolution of diabetic macular oedema may occur at 1 week following intravitreal steroid injection.**

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Keywords: diabetic macular oedema; intravitreal triamcinolone

Introduction

Visual impairment in diabetes mellitus is commonly due to exudative maculopathy. Treatment for this condition traditionally involves argon laser photocoagulation,[1] despite which many eyes lose vision over time.[2] Recently, improvements in macular architecture and visual function, both with and without previous laser photocoagulation, have been demonstrated after intravitreal administration of triamcinolone,[3,4] the earliest recorded benefit having been at 1 month post-treatment.

At the Queen's Medical Centre, Nottingham we have been treating selected cases of diabetic macular oedema with intravitreal triamcinolone, since June 2002 (37 eyes of 32 patients). In our experience, patients often report early subjective visual improvement after intravitreal steroid administration.[5] We therefore performed a retrospective case record review to assess whether such subjective benefit is accompanied by objective improvement of visual function and macular architecture.

Case series

Visual and anatomical improvement 1 week after pars plana injection of 4 mg of intravitreal triamcinolone (Kenalog, Squibb) under local anaesthesia with indirect ophthalmoscopic monitoring, were studied in seven phakic eyes of seven Type II diabetics with clinically significant macular oedema (Table 1).

Best-corrected visual acuity for distance (BCVA, LogMAR) and reading acuity (RA, Near Vision Test Type Chart, Faculty of Ophthalmologists, Clement Clarke) and central macular thickness (CMT) with optical coherence tomography (OCT) (Fast Macular Thickness

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Table 1 Demographics of the seven treated eyes

Patient	*Age*	*Sex*	*Eye*	*Retinopathy*	*Duration of CSMO*	*Previous episodes of macular laser*		*Months from last macular laser to intravitreal triamcinolone*
						Grid	*Focal*	
A	65	M	L	Treated PDR	8	1	1	81
B	79	F	R	Moderate NPDR	8	0	1	5
C	52	M	R	PDR	21	0	2	39
D	65	M	R	Treated PDR	9	0	0	NA
E	79	M	L	Mild NPDR	51	1	0	34
F	65	M	R	NPDR	31	0	4	10
G	59	F	R	Severe NPDR	9	4	2	7

PDR, proliferative diabetic retinopathy; NPDR, nonproliferative diabetic retinopathy; CSMO, clinically significant macular oedema.

Table 2 Visual acuity and central macular thickness measurements prior and 1 week subsequent to intravitreal triamcinolone injection

Patient	*Pretreatment*				*1 week post-treatment*				*Difference*		
	LogMAR VA	*CMT*	*RA*	*Near add*	*LogMAR*	*CMT*	*RA*	*Near add*	*LogMAR*	*CMT*	*RA lines*
A	0.7	381	N18	+3.00	0.62	366	N8	+3.00	0.08	15	5
B	0.6	378	N12	+3.00	0.4	346	N8	+3.00	0.2	32	3
C	0.6	306	N14	+2.50	0.44	196	N5	+4.00	0.16	110	6
D	0.6	711	N8	+2.50	0.32	349	N5	+3.00	0.28	362	2
E	0.62	484	N10	+4.00	0.56	369	N8	+3.50	0.06	115	2
F	0.3	566	N6	+4.00	0.34	379	N5	+4.00	−0.04	187	1
G	0.62	602	N12	+4.00	0.34	367	N6	+4.00	0.28	235	4

LogMAR VA, logMAR best corrected visual acuity; CMT, central macular thickness in μm; RA, best-corrected reading acuity.

Scan, Stratus/Zeiss OCT III) were assessed prior and 1 week subsequent to treatment.

Results

The subjects' ages ranged from 52 to 79 years (mean 66 years), while the duration of macular oedema ranged from 8 to 51 months (mean 19.6 months). Mean LogMAR BCVA improved by 0.146 from 0.58 to 0.43 ($P = 0.03$), all patients except one exhibiting improvement. Mean near acuity improved by 3 lines. Mean CMT decreased by 150.9 μm from 490 to 339 μm ($P = 0.02$, Wilcoxon-signed rank test) (Table 2).

Discussion

Diminution of near (reading) vision secondary to diabetic maculopathy is particularly debilitating. Our subjects universally experienced improvements in reading vision 1 week after treatment, associated with objective reduction of macular thickness on OCT. We are aware of only one previous study that has demonstrated improvements in reading ability after treatment (grid laser photocoagulation) for diabetic macular oedema.[6]

Closer inspection of our results reveal some interesting cases. Patient A experienced a 5-lines improvement in RA despite a mere 3.9% reduction in CMT. In contrast, patient G experienced improvements of 14 letters in LogMAR BCVA and 4 lines in RA associated with CMT reduction of 39%. Patient C achieved excellent RA (N5) mirrored by a normal appearing 1-week post-treatment OCT (Figure 1a and b).

Triamcinolone acetonide, a minimally water-soluble suspension, has interesting intravitreal3 pharmacokinetics, with considerable intersubject variation in peak concentrations achieved and elimination half-lives.[7] The longevity of the therapeutic effect is correspondingly variable, vitrectomised eyes for example exhibiting a shorter elimination half-life. It is tempting to speculate whether the efficacy of treatment is related to the achieved (and maintained) intraocular concentrations of triamcinolone.

Intraocular pressure is known to rise following intravitreal triamcinolone[8] and resolution of macular oedema may be related, in part, to this phenomenon. However, apart from transitory ocular hypertension in one case, our subjects remained normotensive, suggesting that visual and retinal thickness improvements are due either to disruption of the

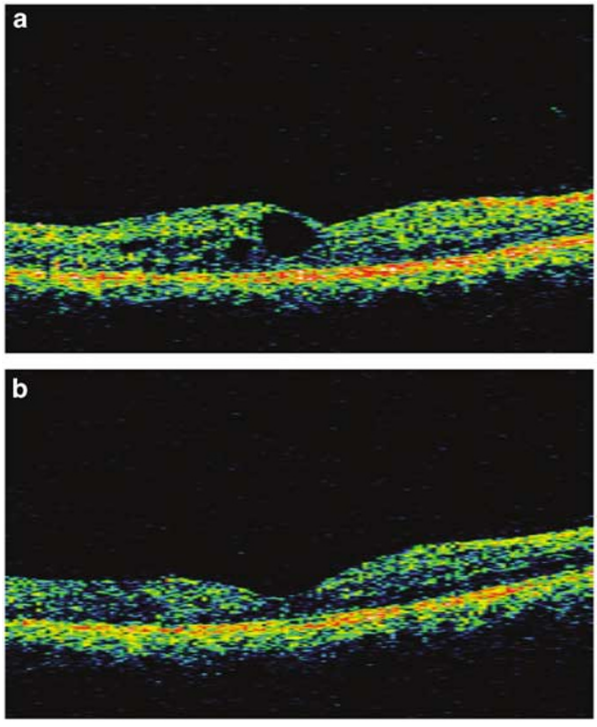

Figure 1 (a) Pre-treatment OCT scan. (b) 1 week post-treatment OCT scan.

vitreous anatomy by the injection process or perhaps to a steroid effect on the retina.

Unresolved issues in relation to intravitreal triamcinolone remain, including the optimal dosage schedule and long-term safety/efficacy. We have demonstrated, to our knowledge for the first time, that both anatomical and functional improvement occurs earlier than previously recognised in the treatment of diabetic macular oedema with this treatment modality.

The mechanism of action of this agent however, remains an enigma.

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