Short-term effect of intravitreal anti-VEGFs delivery on intraocular pressure

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S Nabili, M Stevenson, U Chakravarty and T Moutray

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and epilepsy during Ramadan.[1–5] They showed that during the fasting periods, more than 50% of patients change their drug regimes.[1–5] To help improve compliance, these specialties have successfully formulated management plans in-keeping with the patient's religious practices.[1]

Ophthalmologists have investigated compliance with ocular treatment; however, the impact of religious beliefs has not been assessed.[6]

Our results highlight that non-compliance with drops should be anticipated during Ramadan, and it is not possible to predict the views of an individual with regards to the use of drops, based on demographic or educational factors.

It may be possible to improve compliance by educating patients regarding the potential long-term damage that can be caused by non-compliance and formulating management strategies in keeping with the patients' religious beliefs and taboos.

N Kumar,[1] M Dherani,[2] S Jivan[3]

[1] St Paul's Eye Unit, Royal Liverpool University Hospital, Liverpool, UK; [2] University of Liverpool, Liverpool, Liverpool, UK; [3] St James University Hospital, Leeds, UK

Correspondence to: Dr N Kumar, St Paul's Eye Unit, Royal Liverpool University Hospital, Liverpool L3 8XP, UK; nishant6377@gmail.com

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Since the successful introduction of anti-vascular endothelial growth factor (VEGF) intravitreal injections (IVT) for the management of age-related macular degeneration (AMD), this treatment has gained popularity. Several studies have reported on the complications of anti-VEGF IVT, including a transient rise in intraocular pressure (IOP).[1]

We aimed to determine whether IOP measurement post-IVT is necessary following injection of the commonly used anti-VEGF agents: ranibizumab (Lucentis), bevacizumab (Avastin) and pegabtanib (Macugen).

METHOD

This was a retrospective observational study of postinjection change in IOP in patients with neovascular AMD who received an injection of an anti-VEGF drug between September 2006 and March 2008. Patients were treated with one of three anti-VEGF drugs (ranibizumab 0.5 mg, bevacizumab 1.25 mg, pegabtanib 0.3 mg) using a sterile technique. Povidine iodine 5% preparation and topical oxybuprocaine anaesthetic were used. IOP was measured using Goldman applanation tonometry prior to and 5 min following IVT drug delivery. Any IOP higher than 40 mm Hg was rechecked at 15 min intervals until it normalised.

RESULTS

Data from 57 eyes of 57 patients (male n = 14), with an age range of 31–92 years (mean 77, SD 9), were included in the analysis. A statistically significant rise in the IOP (7.94 mm Hg, SD 7.3) was noted at 5 min postinjection. In one-third of patients, the change in IOP exceeded 10 mm Hg. In three of these, the rise exceeded 20 mm Hg, and in one the rise was 38 mm Hg. There was no statistically significant difference in IOP change noted between the drugs used (see table 1). The standard deviation of the change was much higher in the ranibizumab subgroup (8.99 versus 2.31 for bevacizumab and 5.72 for pegaptanib). Correlations between the change in IOP and other potential explanatory variables of age and gender were not statistically significant.

DISCUSSION

We report on the immediate postinjection IOP change in patients who received intravitreal drug delivery. Overall, the mean rise in IOP which was noted at 5 min was not statistically significant. Although one-third of our patients experienced rises of IOP greater than 10 mm Hg, very few had a rise in IOP of 20 mm Hg or higher, but a rapid return to normal levels was observed. The sole patient with an increase in excess of 30 mm Hg had an initial IOP of 28 mm Hg, suggesting a degree of pre-existing compromised aqueous outflow.

Heier *et al*[2] found that 22.6% of 64 patients receiving repeated ranibizumab injections developed significantly elevated IOP, defined as an increase in IOP of 10 mm Hg or more from baseline. In a subsequent report, the same author[3] noted that 28% of patients injected with escalating doses of ranibizumab had significantly elevated IOP measured at 1 h postinjection. Frenkel *et al*,[4] in a study of 75 eyes, reported that 5.3% of patients developed immediate IOP elevation of sufficient severity to cause transient no perception of light (NPL). Hariprasad *et al*[5] found that 13% of patients developed IOP of 30 mm Hg or higher 30 min after pegaptanib injection. In both studies, IOP normalisation following early spikes was noted within 30 min.

In the present study, IVT drug type, age or gender did not appear to have a significant effect on IOP changes. However, the pegaptanib subgroup in our study was very small. We did observe that the standard deviation of IOP change was highest in the ranibizumab subgroup. Both pegabtanib and bevacizumab are supplied in preloaded syringes of fixed volume. Small errors in syringe loading may occur while drawing up ranibizumab from the glass phial into the supplied syringe and contribute to the higher variability in IOP change.

In conclusion, our findings suggest that routine checks of IOP pre- and post-IVT delivery of anti-VEGF agents in the management of neovascular AMD are not necessary. However, when there is concern about the status of the aqueous outflow systems, IOP checks may be necessary.

S Nabili,[1] M Stevenson,[2] U Chakravarty,[1,3] T Moutray[1]

[1] Directorate of Ophthalmology, Head and Skeletal Division, Royal Victoria Hospital Belfast, Belfast, UK; [2] Centre for Population Sciences, The Queen's University of Belfast, Belfast, UK; [3] Centre for Vision Sciences, The Queen's University of Belfast, Belfast, UK

Correspondence to: Dr T Moutray, Department of Ophthalmology, Royal Victoria Hospital, Belfast, UK; tanya.moutray@btopenworld.com

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Table 1 Analysis of intraocular pressure change 5 min following intravitreal injections

Intravitreal injection of antivascular endothelial growth factor	No	Mean intraocular pressure change (mm Hg)	SD
Ranibizumab	29	8.04	8.99
Bevacizumab	25	5.33	2.31
Pegabtanib	3	8.18	5.72

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Surgical management of macular holes: a national survey of current UK practice

Vitrectomising surgery is the conventional treatment modality for idiopathic stage 3 and 4 macular holes; the exact surgical method and postoperative care, however, are not entirely agreed upon, with treatment ultimately depending on the preferences of the individual surgeon. We aimed to collect information on macular hole surgery and outcomes by conducting on online survey of all members of the Britain and Eire Vitreo-Retinal Society regarding their preferred surgical approach to evaluate current clinical practice in the UK regarding management.

The validity of this study is dependent on the accuracy of the responses we received. Our response rate of 36% compares favourably with 34% for similar surveys in the Germany, Austria and Switzerland in 2006.[1] This survey may not reflect the practice of all ophthalmologists in the UK, and we do not claim to provide evidence of clinical superiority of any one particular procedure or technique over another.

Reports of dye toxicity were reflected in UK practice with only 23% using Indocyanine Green (ICG). Comments in ICG users reflected the knowledge of potential concerns, the dye being used at a low concentration (0.05%) and for "a minimal amount of time," less than 30 s being the commonest.

The majority of surgeons preferred sequential vitrectomy and phacoemulsification; the commonest problems encountered when combining surgery were inconsistent refractive results, intraocular lens dislocation, early posterior capsule opacification and worse postoperative inflammation, all of which are well reported in the literature to differing extents,[2] but again other authors report minimal postoperative complications,[3] the difference possibly being accounted for in technique and learning curve.

Only 11% of surgeons were using 25G systems, but it may be that the trend is toward smaller gauge systems, and if the survey was repeated the results are likely to reflect this.

Reported outcomes are impressive. It is uncertain, from the format of the survey, whether a 100% closure rate was the result of careful and selective case choice, meticulous surgical technique, postoperative regimens or likely a combination of all three. We have limited ourselves to discussing surgical methodology, assuming patient factors would be similarly variable throughout the UK, which may not be true, and may well have an influence on surgical outcomes.

Table 1 Summary of the responses to the online questionnaire by 192 Britain and Eire Vitreo-Retinal Society members who were invited to participate

Response rate	36%
Vitrectomies per month per surgeon	
>10	5%
5–10	27%
<5	68%
Choice of tamponade agent	
C3F8	55%
SF6	17%
Silicone oil	1%
Other	27%
Posturing	
No posture	22%
Face down	78%
<1 week	12%
1 week	33%
>1 week	55%
Posturing 100% of the day	14%
Posturing 75% of the day	80%
Posturing 50% of the day	6%
Internal limiting membrane peeling	
Peel in all cases	72%
Peel specific cases	28%
Trypan Blue	69%
Indocyanine Green	23%
No stain	8%
Combined surgery (phacoemulsification, intraocular lens implantation, pars plana vitrectomy)	
All cases	17%
Three-quarters of cases	9%
Half of cases	14%
Quarter of cases	60%
Instrumentation	
20G	88%
23G	1%
Adjuvant agents	
Never	88%
Sometimes	6%
No reply	6%
Outcomes	
Mean closure rate	93%
Range closure rates	73–100%
Mean gain of 2 Snellen lines	73%
Range gain 2 Snellen lines	40–95%

To our knowledge, there is only one other survey on macular hole surgery from the German Retinal Society.[1] In their series, 86% stained the internal limiting membrane, and the dye of preference was ICG (80%), with only 4% using Trypan Blue. There was a large range of ICG concentrations used, the most common being 0.1% ICG, but rather surprisingly 7% of polled surgeons were using ICG at a concentration of 10%. This contrasts sharply with the use of vital dyes by UK surgeons. SF6 was the choice of gaseous endotamponade in 53% of European surgeons, while their UK counterparts favoured C3F8 to a similar extent (55%); postoperative posturing routines did not vary significantly. Similarities were in the low use of adjuvant therapies (7% used platelets) and few performing simultaneous cataract surgery in all cases (7% in the German paper, 17% in the UK).

This survey suggests that the practice of surveyed UK Vitreoretinal surgeons falls comfortably within the current evidence base for macular hole surgery, and the surgical method is varied according to hole size and chronicity, and whether or not it is a repeat procedure.

R S Khan, K N Khan, M T Costen

Hull and East Yorkshire Eye Hospital, Hull, UK

Correspondence to: Dr K N Khan, Hull and East Yorkshire Eye Hospital, Fountain Street, Anlaby Road, Hull HU3 2JZ, UK; kamronkhan@yahoo.com

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