**Table 1** Histological profile of the cases reviewed

| | All cases | Fatal outcome group | | Surviving group | | | |
|---|---|---|---|---|---|---|---|
| | N = 19 | N = 6 | % | N = 13 | % | $\chi^2$ | p Value |
| Degree of differentiation | | | | | | | |
| Well differentiated | 6 | 0 | 0.0 | 6 | 100.0 | 4.05 | 0.10 |
| Moderately differentiated | 4 | 1 | 25.0 | 3 | 75.0 | 0.10 | 1.0 |
| Poorly differentiated | 9 | 5 | 55.5 | 4 | 44.5 | 4.55 | 0.057* |
| Presence and type of rosette | | | | | | | |
| Flexner Wintersteiner | 8 | 2 | 25.0 | 6 | 75.0 | 0.28 | 1.0 |
| Homer Wright | 2 | 0 | 0 | 2 | 100 | 1.0 | 1.0 |
| Perivascular | 8 | 6 | 75.0 | 2 | 25.0 | 12.06 | 0.001* |
| Degenerative changes | | | | | | | |
| Necrosis | 14 | 6 | 42.9 | 8 | 57.1 | 3.13 | 0.12 |
| Calcification | 1 | 0 | 0 | 1 | 100 | 1.0 | 1.0 |
| Optic nerve involvement | | | | | | | |
| Postlaminar | 11 | 6 | 54.5 | 5 | 45.5 | 6.38 | 0.018* |
| Prelaminar | 8 | 0 | 0 | 8 | 100 | 3.25 | 0.136 |

p Value = two-tailed p value.
*All cases with fatal outcomes had perivascular tumour cuffing, which when compared with the two cases among the surviving group with perivascular tumour cuffing was statistically significant ($p = 0.001$, $\chi^2 = 12.06$).
All cases with fatal outcomes exhibited significant tumour necrosis compared with the eight among the surviving group ($p = 0.12$; $\chi^2 = 3.13$).

## How to treat recurrences after Avastin treatment for neovascular AMD: stick to Avastin or switch to Lucentis?

Before the recent approvement of ranibizumab (Lucentis) for the treatment of neovascular age-related macular degeneration (AMD), bevazicumab (Avastin) had been successfully used as an off-label treatment for this condition.[1] As a consequence, in daily practice we are confronted with a large number of patients having received Avastin injections in the past, now facing a recurrence of the disease and therefore requiring additional injections.[2] This leaves the ophthalmologist in a medical dilemma: should one continue with the off-label drug Avastin or switch to Lucentis? From a clinical point of view and disregarding the legal aspects of continuing an off label treatment, this is not easy to answer, as there are no comparative data available at present.[3] Given this background, we compared the effect of Lucentis and Avastin in a retrospective analysis of a matched case series of patients with recurrent neovascular AMD who were initially treated with Avastin.

Sixty-four patients who had finished upload therapy were selected. Upload therapy existed of consecutive injections of intravitreal Avastin every 4–6-week untill the disapearance of macular oedema on OCT. All of these patients presented with a recurrence of neovascular AMD and had undergone treatment of the recurrence with Avastin (group 1, n = 32) or Lucentis (group 2, n = 32) thereafter. Comparing both groups, there was no significant difference concerning visual acuity (VA), central macular oedema in OCT measurement and age before therapy; this also went for the gain of VA and decrease in macular oedema following upload therapy, as well as the documented decrease in VA and increase in retinal thickness measured as a result of the recurrence of the disease, indicating that both groups were very well matched (table 1). In both groups, therapy for the recurrence continued until a resolution of the macular oedema with sequential injections at 4–6-week intervals was seen, number of injections did not differ significantly (group 1: 2.5 injections, group 2: 2.7 injections). Comparing patients having received Lucentis and Avastin, no significant difference concerning the development of VA (see fig 1) was seen, with both groups experiencing an improvement of VA. In contrast, concerning the regression of macular oedema, the effect was more pronounced in group 2 ($p<0.028$).

However, using Lucentis or Avastin, the mean VA did not reach the level measured before the recurrence had occurred ($p<0.05$, Wilcoxon test for paired samples).

Our results indicate a difference in the effect of Lucentis and Avastin when used for the treatment of a recurrence of neovascular AMD after initial Avastin treatment, with slightly better results seen for Lucentis (at

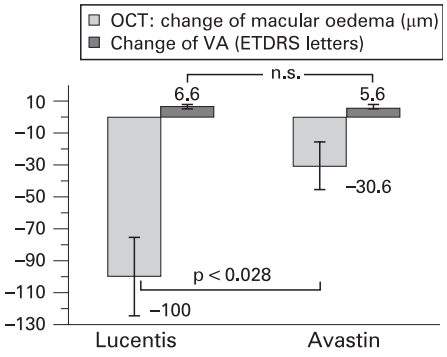


**Figure 1** Treatment of recurrent neovascular age-related macular degeneration after intravitreal Avastin intravitreal therapy. Both groups showed an increase in visual acuity (VA) and a decrease in macular oedema. However, regarding the regression of macular oedema in our groups, there was more benefit for patients having been treated with Lucentis ($p<0.028$) ETDRS, Early Treatment Diabetic Retinopathy Study; OCT, optical coherence tomography.

**Table 1** Characteristics of the two groups

| | Group 1—Rescue treatment: Avastin | Group 2—Rescue treatment: Lucentis | p Value |
|---|---|---|---|
| Baseline | | | |
| Age (years) | 76.9 | 77.2 | 0.54 |
| Sex (female) | 75% | 69% | 0.32 |
| VA (before upload) | 0.3 | 0.27 | 0.99 |
| Macular oedema (OCT) | 332 μm | 338 μm | 0.5 |
| Upload with Avastin | | | |
| Pretreatment (no. of Avastin injections during upload) | 3 | 2.7 | 0.31 |
| OCT—after upload | 242 μm | 221 μm | 0.2 |
| VA increase during upload (ETDRS letters) | +5.9 | +8.7 | 0.4 |
| Recurrence | | | |
| Recurrence (weeks after last injection) | 17.8 | 14.6 | 0.3 |
| Recurrence (ETDRS letters) | −11.3 | −11.9 | 0.6 |
| Recurrence (OCT) | +82 μm | +98 μm | 0.5 |

In the mean, there was no difference between the groups before treatment of recurring neovascular AMD. This went for baseline characteristics before upload therapy, effects on visual acuity (VA) and retinal thickness during upload treatment and clinical parameters when presenting with the recurrence of neovascular AMD.
ETDRS, Early Treatment Diabetic Retinopathy Study; OCT, optical coherence tomography.

least concerning the regression of macular oedema). We are of course aware that definite conclusions cannot be drawn, and recommendations can not be given based on our data due to the small number of patients and the retrospective nature of our analysis. Nevertheless, as both groups were carefully matched as mentioned above, our results underline the need for a prospective comparative trial as mentioned by other groups.[3]

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## REFERENCES

1. **Rosenfeld PJ,** Moshfeghi AA, Puliafito CA. Optical coherence tomography findings after an intravitreal injection of bevacizumab (avastin) for neovascular age-related macular degeneration. *Ophthalmic Surg Lasers Imaging* 2005;**36**:331–5.
2. **Rosenfeld PJ,** Rich RM, Lalwani GA. Ranibizumab: Phase III clinical trial results. *Ophthalmol Clin North Am* 2006;**19**:361–72.
3. **Klein RM,** Klein RB. Avastin versus Lucentis: ethical issues in treatment of age-related macular degeneration. *Retina* 2007;**27**:1163–5.

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