Original Article

Intravitreal Bevacizumab for the Treatment of Subfoveal Choroidal Neovascularization Secondary to Age Related Macular Degeneration

Muhammad Naeem Azhar, Muhammad Ali Haider, Haroon Tayyab, Arslan Ahmed
Zaheer-ud-din Aqil Qazi

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See end of article for authors affiliations

Correspondence to:
Muhammad Naeem Azhar
Resident Medical Officer
LRBT Free Eye Hospital
Lahore

Purpose: To determine the mean percentage decrease in central macular thickness with intravitreal Bevacizumab for the treatment of subfoveal Choroidal Neovascularization secondary to Age related Macular Degeneration.

Material and Methods: From September 2009 to March 2010, thirty five diagnosed patients of subfoveal choroidal neovascularization secondary to age related macular degeneration were taken from out-door patient department of Layton Rahmatulla Benevolent Trust Eye and Cancer Hospital, Lahore. After taking aseptic measures intravitreal Bevacizumab (Avastin) injection (1.25 mg/ 0.05 ml) was injected through pars plana. Post injections follow up was done by central macular thickness (in µm) measured by Optical coherence tomography at 4^{th} week, 8^{th} week and finally at 12^{th} week.

Results: Thirty five eyes of 35 consecutive patients received the three injections of intravitreal Bevacizumab 1.25 mg / 0.05 ml, each injection 4 weeks apart and all patients had 3 months of follow up. Mean central macular thickness ± SD decreased from 308.86 ± 39.13 µm at baseline to 228 ± 17.62 µm at 12^{th} week. In our study mean percentage decrease in central macular thickness was 26.18% at 12^{th} week after three intravitreal Bevacizumab injections.

Conclusion: Intravitreal Bevacizumab injection results in short term decrease in central macular thickness to normal or near-normal levels in eyes with choroidal neovascularization secondary to age-related macular degeneration.

Age related macular degeneration (AMD) is the leading cause of irreversible visual loss in the elderly; severe visual loss in such cases is most often due to subfoveal choroidal neovascularization (CNV).[1] Increased expression of vascular endothelial growth factor (VEGF) has been shown in human eyes with neovascular AMD; inhibition of VEGF – related angiogenesis has been evaluated to treat CNV[1].

Bevacizumab (Avastin), the full-length humanized monoclonal anti-VEGF antibody, when injected into the vitreous cavity, has been shown to be effective for preventing visual loss and improving visual acuity in patients with neovascular AMD.[2] Although not currently approved by the FDA for such use, the injection of 1.25 – 2.5 mg of Bevacizumab into the vitreous cavity has been performed without significant intraocular toxicity.

Optical coherence tomography (OCT) is a high resolution imaging device capable of obtaining macular thickness measurements, which enabled clinicians to detect and measure small changes in macular thickness.[6] Rationale of the study is to document the effect of intravitreal Bevacizumab (Avastin) on subfoveal CNV secondary to AMD.

MATERIAL AND METHODS

This was a Quasi experimental study conducted at retina clinic of Layton Rahmatulla Benevolent Trust Eye and Cancer Hospital Lahore, for duration of 6 months from 15th September 2009 to 14th March 2010. The inclusion criteria consisted of following: age 55-65 years, visual acuity less than or equal to 6/60 measured by Snellen's visual acuity chart, patients with active subfoveal CNV as diagnosed with fundus fluorescein angiography (FFA) and Optical coherence tomography (OCT). Exclusion criteria comprised of following: any retinal pathology other than subfoveal CNV secondary to AMD; diagnosed clinically on Slitlamp Biomicroscopy, history of ocular trauma, patients with ocular inflammation, any media opacity, patients previously treated with photodynamic therapy or intravitreal triamcinolone acetonide, patients who had an allergic reaction to fluorescein and a history of vitrectomy.

Thirty five diagnosed patients of subfoveal CNV secondary to AMD fulfilling the above mentioned inclusion criteria were taken from outdoor patient department (OPD) of Layton Rahmatulla Benevolent Trust Eye and Cancer Hospital, Lahore. Informed consent was taken from all patients.

The data was collected on a predesigned proforma comprising of two portions. First portion containing demographic information (name, age, gender) was taken at the time of recruitment. Second portion contained study variable Central macular thickness (in μm).

Intravitreal Bevacizumab injection (1.25 mg / 0.05 ml) was injected at baseline, followed by two additional injections at 4 weeks intervals. Post injection follow up was done by Central macular thickness (in μm) measured by OCT at 4th week, 8th week and finally at 12th week.

DATA ANALYSIS

Collected data was entered and analyzed using SPSS version 10. The Quantitative variables like age were presented as mean ± SD. The Qualitative variable like gender was presented as frequency and percentage, and mean percentage decrease in central macular thickness from baseline was calculated finally at 12th week after intravitreal Bevacizumab (Avastin) injections by using the formula "$X_1 - X_2 / X_1 \times 100$ "where X_1 is mean CMT at baseline, X_2 is mean CMT at 12th week.

RESULTS

In the distribution of gender, there were 19 (54.3%) male patients and 16 (45.7%) female patients**.** In the distribution of age, the minimum age was 45 years and maximum 64 years. The mean age of the patients was 53.91 ± 5.53 years**.**

Table 1: Mean percentage decrease in Central macular thickness at 12th week

Mean Central Macular Thickness	Mean (um)	Mean Percentage decrease in CMT "$X_1 - X_2 / X_1 ^{x} 100$"
Baseline (X1)	308.86	308.86 - 228.0 / 308.86 $^{x}100$ = 26.18%
At 12th week (X_2)	228.00	

CMT: Central macular thickness, um: Micron meter

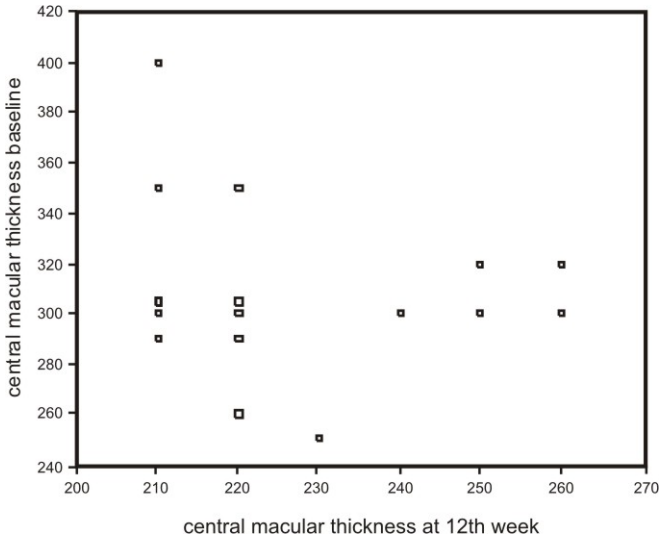

Fig. 1: Scatter plot of baseline central macular thickness (in μm) vs central macular thickness at 12th week after receiving three intravitreal Bevacizumab injections for subfovealchoroidal neovascularization (CNV) secondary to age-related macular degeneration (AMD). All points showed improvement at 12th week in central macular thickness.

Baseline (before intravitreal Bevacizumab 1.25mg/ 0.05 ml injection) mean central macular thickness measured by OCT ± SD was 308.86 ± 39.13 μm. At 4th week (after 1stintravitreal Bevacizumab 1.25 mg / 0.05 ml injection) mean central macular thickness measured by OCT ± SD was 276.14 ± 27.04 μm**.** At 8th week (after 2nd intravitreal Bevacizumab 1.25 mg /

0.05 ml injection) mean central macular thickness measured by OCT ± SD was 250 ± 19.10 µm**.** At 12th week (after 3rd intravitreal Bevacizumab 1.25 mg / 0.05 ml injection) mean central macular thickness measured by OCT ± SD was 228 ± 17.62 µm**.** Mean percentage decrease in central macular thickness was 26.18% (Table 1).

Figure 1 Shows scatter plot of baseline central macular thickness (in µm) vs central macular thickness at 12th week after receiving three intravitreal Bevacizumab injections for subfoveal choroidal neovascularization (CNV) secondary to age-related macular degeneration (AMD).

In our study thirty five eyes of 35 consecutive patients received the three injections of intravitreal Bevacizumab 1.25 mg / 0.05 ml, each injection 4 weeks apart and all patients had 3 months of follow-up. Mean central macular thickness ± SD decreased from 308.86 ± 39.13 µm at baseline to 228 ± 17.62 µm at 12th week. In our study mean percentage decrease in central macular thickness was 26.18% at 12th week (after three intravitreal Bevacizumab injections).

DISCUSSION

In this study, intravitreal Bevacizumab injection 1.25 mg / 0.05 ml administered over a 3 month period, each injection 4 weeks apart resulted in reduction in central macular thickness to normal or near-normal levels measured by OCT. These OCT results are comparable with findings of previously reported studies concerning the anatomical and functional benefits of intravitreal Bevacizumab[4,8]. Avery described complete resolution of retinal edema in 37% of eyes 4 weeks after initial injection of Bevacizumab and in 49% of eyes 8 weeks after initial injection when treated monthly on an as – needed basis[4].

In our study baseline central macular thickness was 308.86 ± 39.13 µm, and post injections central macular thickness at 12th week was 228 ± 17.62 µm that is coherent with results obtained by previously reported studies by Avery.[4]

We found that intravitreal Bevacizumab is effective in decreasing the central macular thickness in patients of choroidal neovascularization secondary to age – related macular degeneration. In our study mean percentage decrease in central macular thickness was 26.18% at 12th week (after three intravitreal Bevacizumab Injections), which is comparable with previously reported study byEmerson[8] in which mean percentage decrease in central macular thickness was 22%.

CONCLUSION

Intravitreal Bevacizumab (Avastin) injection results in short – term decrease in central macular thickness to normal or near – normal levels in eyes with choroidal neovascularization (CNV) secondary to age – related macular degeneration (AMD).

Author's Affiliation

Dr. Muhammad Naeem Azhar
Resident Medical Officer
LRBT Free Eye Hospital
Lahore

Dr. Muhammad Ali Haider
Medical Officer
Lahore General Hospital
Lahore

Dr. Haroon Tayyab
Senior Registrar
Jinnah Hospital
Lahore

Dr. Arslan Ahmed
Resident Medical Officer
LRBT Free Eye Hospital
Lahore

Dr. Arslan Ahmed
Resident Medical Officer
LRBT Free Eye Hospital
Lahore

Dr. Zaheer Uddin Aqil Qazi
Chief Consultant Ophthalmologist
LRBT Free Eye Hospital
Lahore

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