

A Possible New Treatment Method for Age-Related Macular Degeneration: A Preliminary Study

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Abstract

Background: Age-related macular degeneration (AMD) is a disease that occurs in older ages and causes irreversible blindness. There is no curative treatment for AMD currently. The aim of this study is to investigate the efficacy of a new treatment method in AMD.

Methods: This was a prospective study. 14 patients with AMD were included to the study. We prepared a new solution including Coqun (0.5 cc) and PRP (platelet rich plasma, 1.5 cc). Totally, a 2 cc solution is obtained. The solution was injected into the subtenon space in the damaged eyes of patients once a week for three consecutive weeks. Before the treatment, first, second, and third month after the first application, Vo findings were noted and the data was compared statistically.

Results: Mean age of the patients was 65.4 ± 5.82 and 50% (N=7) of the patients were male. According to the preop period, first, second, and third month Vo values increased significantly ($p < 0.05$). Vo values of the patients were found to be increased as the time progressed ($p < 0.05$)

Conclusion: It can be speculated that this new method may be an effective treatment for AMD patients.

Keywords: Age-related macular degeneration; Coqun; Treatment; ophthalmology

Introduction

Age-related macular degeneration (AMD) is the leading cause of irreversible blindness over the age of 50 years in our current world [1,2]. The neovascular form of this macular degeneration often leads to an advanced vision loss. Capillary vessels localized in the macula are responsible for clear and transparent vision and these vessels are located in the center of the retina. The neovascular form is caused by the rapid and uncontrolled formation of these capillary vessels. Age-related factors that trigger pathological new capillary vessel formation have not yet been fully elucidated. Various vascular growth factor antibodies have been used for this purpose, but they have not prevented the vision loss [2].

Macular degeneration can be diagnosed by fluorescein angiography. The disease is divided into two parts according to the angiography findings. First one is classical macular

degeneration and the other one is hidden macular degeneration [3]. Verteporfin photodynamic therapy and pegaptanib are among the available treatments of these macular degenerations in the world. Above mentioned treatments may slow the progression of vision loss, and visual acuity may improve in a very low proportion of patients [4].

Many studies and new agents are needed for possible treatments because of the high cost of available treatments and lack of satisfactory results. Our hypothesis is to obtain the necessary factors for the metabolism of the retinal pigment epithelium by mixing patient's own plasma with Coqun solution and to apply this mixture to the level that it can affect the retinal pigment epithelium adequately. Additionally, our goal of this study is to determine that this new mixture will be effective for AMD and progressive vision loss, or not.

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Methods

The study protocol was approved by the Ethics Committee of Adana City Hospital in Adana in Turkey. The nature and purpose of the study were explained to all patients and informant consent was obtained from all patients.

The present study was performed prospectively. 14 patients with AMD who admitted to the ophthalmology clinic of Adana Ortadogu Hospital between January-December 2017 were included to the study. Fundus examination was done with slit lamp using cyclopentolate. The patients with dry type scars, geographic scars, disciform scars, and atrophies were included to the study. The patients with macular (zone 1) thickness of 120-200 micrometers in optical coherence tomography were included to the study. The patients with diabetic retinopathy, trauma, and active choroidal neovascular membrane were excluded from the study.

Mixture preparation: Coqun solution, which is frequently used in the treatment of different clinical conditions, includes 1 mg coenzyme Q10 and 5 mg vitamin E TPGS (D-α tocopheryl polyethylene glycol 1000 succinate). We obtained 0.5 cc from this solution. In addition, PRP (platelet rich plasma) is obtained by centrifuging the blood from the patients at 8000 rpm for 15 minutes (1.5 cc). Totally, a 2 cc mixture is obtained.

The use of mixture for treatment: The right/left eye was wiped with 10% batticon under topical anesthesia. A 2 cc mixture was injected into the subtenon area in the damaged eyes of patients once a week for three consecutive weeks. As a result of this process, the mixture was allowed to be effective directly on macula. After the surgery, a drop of moxifloxacin-dexamethasone solution was started four times a day to prevent postoperative infections. The patients used the moxifloxacin-dexamethasone solution for a week.

Before the treatment, first, second, and third month after the first application, Vo examination findings were noted and the data was compared statistically. Vo values were examined with Snellen Chart (best corrected visual acuity).

Statistical method

Mean, standard deviation, median lowest, highest, frequency and ratio values were used in descriptive statistics of the data. The distribution of the variables was measured with the Kolmogorov Simirnov Test. Wilcoxon test was used for the analysis of dependent quantitative data. SPSS 22.0 program was used in the analysis.

Results

Table 1 shows the demographic variables of the patients. Mean age of the patients was 65.4 ± 5.82. 50% (N=7) of the patients were male, and 50% (N=7) were female. 52% (N=13) of the patients had AMD in the right eye, and 48% (N=12) had in the left eye.

Table1: Demographic variables of the patients.

	Mean	SD
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Age		65.4	5.82
		N	%
Gender	Male	7	50
	Female	7	50
Eye side	Right	13	52
	Left	12	48

The comparison of the Vo values of the patients is presented in Table 2. According to the preop period, first month Vo value increased significantly (p<0.05). Second month Vo value significantly (p<0.05) increased compared to the preop period. Third month Vo value also increased significantly (p<0.05) compared to the preop period. Second month Vo value increased significantly (p<0.05) compared to the first month. Third month Vo value increased significantly (p<0.05) compared to the second month. Vo values of the patients were found to be increased as the time progressed.

Vo	Min-Max	Median	Mean ± SD	P*	P**
Preop	0.01-0.60	0.05	0.07 ± 0.11		
1 Month	0.01-0.70	0.10	0.12 ± 0.13	0.000	
2 Month	0.02-0.70	0.10	0.15 ± 0.13	0.000	0.001
3 Month	0.03-0.30	0.20	0.17 ± 0.07	0.000	0.003

Wilcoxon Test was used.

*Difference with preop **Difference with previous measurement

Discussion

Blood products have been shown to enhance healing and activate regeneration of different tissues, and this enhancing effect is attributed to growth factors and bioactive proteins found in the blood. PRP provides a higher concentration of essential growth factors and cell adhesion molecules by condensing plasma into a small volume compared to an autologous serum, while the latter is widely used in ophthalmology for corneal epithelial wound healing. These growth factors and cell adhesion molecules have an important role in wound healing and improve the physiological process in the area of injury or surgery [5,6].

PRP has been used more recently, and has achieved successful results in peer review articles in the treatment of sleep ulcers, moderate-severe dry eye syndrome, ocular surface syndrome, and surface reconstruction after corneal perforation associated with laser in situ keratomileusis (LASIK) and amniotic membrane transplantation [5,6].

The preparation of PRP is a cheap and easy method, although it requires strict sterility conditions using sterile and disposable materials and operating within a laminar flow hood. No serious

side effects associated with the use of PRP have been identified and it is generally well tolerated [5,6]. In summary, it can be said that PRP is a reliable and effective treatment tool to improve epithelial wound healing.

AMD is still an unstoppable disease with no medical treatment for people over 50 years of age, despite improved technology. The neovascular form of this disease is seen in one of 10 patients. However, the majority of patients with neovascular macular degeneration experiences severe visual loss [7].

Many treatments have been used to stop macular degeneration, and new drugs are still being investigated. Evangelos et al. tried to treat AMD with 0.3 mg, 1 mg, 3 mg intravitreal injection of pegaptanib. However, they found that 0.3 mg of pegaptanib did not differ significantly from other doses. Complications of endophthalmitis, uveitis, retinal detachment, and lens injury were seen in patients after the application [8]. In another study including 716 patients, ranibizumab injections of 0.3 mg were performed intravitreally and they found a significant improvement in visual acuity compared to placebo. In patients treated with ranibizumab, infection, severe uveitis, and endophthalmitis were determined as complications [9]. Martin et al. included 1107 patients in their study which was a multicenter and randomized clinical trial. ranibizumab and bevacizumab were administered to the patients. After 2 years of follow-up, they showed that the effect of visual acuity on both agents was similar [10].

Compared to these studies, we can say that our method appears to be more effective. We found significant increases in vision in our 3-month follow-up. On the other side, while many complications such as increased intraocular pressure, cataract, retinal detachment, vitreous hemorrhage, and endophthalmitis could be seen in intravitreal injections, these complications were not presented in our subtenon application.

As a conclusion, preliminary findings of our study showed that our hypothesis and treatment method might be successful to treat AMD. However, these findings should be supported by long-term studies with large samples.

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