Original Article

Effect of Bevacizumab on Pterygium: A Case Series Study

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Abstract

Purpose: to study evaluate the effectiveness of a single subconjunctival injection of bevacizumab (Avastin), an anti-vascular endothelial growth factor (VEGF) agent, in reducing pterygium size and vascularization among patients with primary pterygium.
Patients and Methods: Seventeen patients with primary pterygium were enrolled in this case series study. Each patient received a single subconjunctival injection of 1.25 mg bevacizumab. Follow-up evaluations were conducted at one week, one month, and three months post-injection. The primary outcomes included changes in symptoms such as itching, redness, tearing, and burning, as well as pterygium size and vascularization. Statistical analysis was performed using Repeated Measures ANOVA and Paired T-tests.
Results: Itching significantly decreased within the first week and remained stable at three months. Pterygium vascularization was also reduced. However, changes in pterygium size, astigmatism, and refraction were not statistically significant. No serious adverse effects were reported.
Conclusion: A single dose injection of subconjunctival bevacizumab significantly reduces vascularization and itching in pterygium. However, its impact on pterygium size remains unclear. While surgical excision remains the gold standard, subconjunctival bevacizumab offers an alternative treatment approach for patients seeking a minimally invasive alternative. Further studies are needed to determine optimal dosing strategies and long-term effects.

Keywords: Pterygium; Bevacizumab; Anti-VEGF Therapy; Ocular Angiogenesis.

Article Notes: Article Notes: Received: Jun. 03, 2024; Received in revised form: Jun. 29, 2024; Accepted: Jul. 16, 2024; Available Online Sep.22, 2024.

How to cite this article: Daryabari SH, Hassani M, Alishiri A. Effect of Bevacizumab on Pterygium: A Case Series Study. Journal of Ophthalmic and Optometric Sciences . 2024;8(4): 1-6.

Introduction

Pterygium is a common degenerative ocular surface disorder characterized by a fibrovascular proliferation of conjunctival tissue that extends onto the cornea [1,2]. The pathogenesis of pterygium is multifactorial, with prolonged exposure to ultraviolet (UV) radiation being one of the most recognized risk factors. Other contributing factors include chronic inflammation, oxidative stress, genetic predisposition, and dysregulation of cellular growth mechanisms [3]. Pterygium can lead to significant ocular morbidity, including irregular astigmatism, dry eye symptoms, and, in advanced cases, visual impairment due to encroachment on the visual axis [4,5].

Recent research suggests that pterygium shares pathological features with neoplastic processes, including uncontrolled cellular proliferation, extracellular matrix remodeling, and angiogenesis [6]. The overexpression of angiogenic factors such as vascular endothelial growth factor (VEGF) plays a crucial role in the formation and progression of pterygium [7]. Given its involvement in pterygium pathogenesis, VEGF has emerged as a potential therapeutic target for non-surgical management of the condition [8].

Bevacizumab (Avastin) is a recombinant monoclonal antibody that specifically inhibits VEGF, thereby suppressing angiogenesis [9]. Originally developed for the treatment of metastatic colorectal cancer, bevacizumab has been widely used off-label in ophthalmology for various neovascular conditions, including wet age-related macular degeneration (AMD), diabetic retinopathy, and retinal vein occlusion [10]. Given its anti-angiogenic properties, bevacizumab has been investigated as a potential treatment for pterygium to reduce vascular proliferation and associated symptoms [11-13].

This study aims to evaluate the effectiveness of a single dose injection of subconjunctival bevacizumab in reducing pterygium-related vascularization and improving symptom severity in affected patients. By exploring the therapeutic potential of anti-VEGF therapy in pterygium management, this research seeks to determine whether a single dose injection of bevacizumab could serve as a minimally invasive alternative to conventional surgical intervention.

Patients and Methods

This prospective case series study was conducted on seventeen patients diagnosed with primary pterygium at a university-affiliated ophthalmology clinic, Tehran, Iran. The study was approved by the institutional ethics committee and all patients gave written consent before entering the study. Patients were recruited based on predefined inclusion and exclusion criteria. Eligible participants were between twenty and seventy years old, had no history of other ocular diseases or previous pterygium surgery, and exhibited clinical signs of progressive pterygium. Patients with secondary ocular pathologies, prior ocular surgeries, or contraindications to anti-VEGF therapy were excluded from the study.

Each patient underwent a comprehensive ophthalmic examination, including slit-lamp biomicroscopy, intraocular pressure measurement, corneal topography, and best-corrected visual acuity (BCVA) assessment. Baseline clinical photography was performed to document the extent of the pterygium and its associated vascularization.

A single subconjunctival injection of 1.25 mg bevacizumab was administered into the pterygium bed under sterile conditions.

The injection procedure included topical anesthesia with tetracaine 0.5% eye drops, sterilization with povidone-iodine 10%, and drug delivery using an insulin syringe with a 25-gauge needle. Patients were instructed to use chloramphenicol eye drops every six hours for three days post-injection and were advised to avoid eye rubbing or exposure to direct sunlight during the follow-up period.

Follow-up evaluations were conducted at one week, one month, and three months post-injection. At each visit, patients underwent a repeat ophthalmic examination, and clinical parameters, including symptom severity, pterygium size, vascularization grading, and refraction and astigmatism changes, were assessed. Changes in vascularization were graded using slit-lamp biomicroscopy, and digital imaging analysis was employed for objective evaluation of lesion progression or regression. Also related information including the degree of eye irritation, itching, redness, tearing, and burning were evaluated at baseline and each followup.

Data were recorded and analyzed using SPSS version 24 (IBM Corp., Armonk, NY). Statistical comparisons of pre- and post-treatment measurements were performed using repeated measures ANOVA and paired T-tests. A P value of less than 0.05 was considered statistically significant, with results presented as mean values ± standard deviation.

Results

The mean age of the seventeen patients included in the study was 45.52 years, with an age range of 23 to 70 years. Twelve patients were male, and five were female. A significant proportion of participants were involved in occupations requiring prolonged outdoor exposure to ultraviolet radiation, a known risk factor for pterygium development.

Prior to treatment, all patients exhibited symptoms including itching, redness, tearing, and burning. Itching was reported by all patients and showed a statistically significant reduction by the end of the study period. One week post-injection, 70% of patients reported improvement in itching, which was sustained through the three-month follow-up. Redness was present in all patients at baseline but showed only a mild reduction over time, without statistical significance.

Tearing which was noted in a moderate percentage of patients, decreased by more than half at the one-month follow-up, with further reduction at three months. Burning sensation, initially present in a minority of patients, was also significantly reduced post-treatment.

Slit-lamp biomicroscopy and digital imaging assessments revealed a statistically significant reduction in pterygium vascularization following bevacizumab injection. This reduction was most pronounced at one month and remained stable through three months of follow-up. However, measurements of pterygium size showed no statistically significant changes, indicating that while vascular suppression was achieved, lesion regression was minimal. Similarly, no significant changes in refraction or astigmatism were observed.

No serious complications, infections, or adverse ocular effects were reported in any patient. No cases of pterygium recurrence or exacerbation were noted within the three-month follow-up period.

Discussion

Our study demonstrated that subconjunctival bevacizumab significantly reduces pterygium vascularization and alleviates symptoms,

particularly itching, with effects sustained over three months. These findings align with previous research, reported similar reductions in vascularization and itching following bevacizumab injection [14-17]. Sayadi et al.,[14] observed improvements in vascularization but noted no significant changes in lesion size, which is consistent with our findings.

The observed reduction in vascularization supports the role of VEGF in pterygium pathogenesis and highlights bevacizumab as a promising anti-angiogenic therapy [18- 20]. However, the lack of significant lesion regression suggests that while bevacizumab effectively suppresses angiogenesis, it may not be sufficient as a standalone treatment for pterygium resolution [21, 22]. This underscores the need for combination therapies, such as bevacizumab with surgical excision or other adjunctive treatments, to achieve more comprehensive disease control [22].

Several studies have investigated the effects of bevacizumab on pterygium, with varying outcomes [13-23]. While some have reported lesion size reduction following multiple injections [21, 23] others, like our study, have primarily found improvements in vascularization and symptom relief. Differences in study design, dosing regimens, and follow-up duration may account for these discrepancies.

Given the high recurrence rates associated with pterygium surgery, particularly in cases of aggressive fibrovascular growth, bevacizumab may serve as a valuable adjunct to reduce recurrence risk [24,25]. Its role in preoperative or postoperative management warrants further exploration, particularly in patients at high risk of recurrence. In the present study due to short followup period we could not assess the effect of bevacizumab on recurrence rate.

Additionally, bevacizumab might provide a non-surgical option for patients with symptomatic pterygium who are not candidates for surgery due to systemic comorbidities or personal preference [26].

Despite the promising findings, our study has several limitations. The small sample size, not having a control group, and relatively short follow-up period restrict the ability to assess long-term efficacy and recurrence rates. Additionally, a single injection may not be optimal for sustained inhibition of angiogenesis, raising the question of whether repeated dosing or alternative anti-VEGF agents could yield more pronounced effects. Future research should focus on evaluating the impact of multiple bevacizumab injections over extended follow-up periods, comparing different dosing regimens to determine the optimal therapeutic approach, and investigating bevacizumab as an adjunct to surgical excision to assess its role in reducing recurrence rates. Exploring combination therapies with other anti-inflammatory or anti-fibrotic agents may further enhance efficacy and provide more comprehensive disease control [1].

In summary, our study confirms the efficacy of bevacizumab in reducing pterygium vascularization and alleviating symptoms, particularly itching and vascularization. However, its limited effect on lesion size suggests that while anti-VEGF therapy is a valuable adjunct, it may not replace surgical intervention. Future studies with larger cohorts, longer follow-up, and optimized treatment protocols are needed to fully define its role in pterygium management.

Conclusion

A single dose injection of subconjunctival bevacizumab significantly reduces vascularization and itching in pterygium.

However, its impact on pterygium size remains unclear. While surgical excision remains the gold standard, subconjunctival bevacizumab offers an alternative treatment approach for patients seeking a minimally invasive alternative. Further studies are needed to determine optimal dosing strategies and long-term effects.

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Footnotes and Financial Disclosures

Conflict of interest:

The authors have no conflict of interest with the subject matter of the present manuscript.