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A pilot study of low dose doxycycline to lower IOP in patients with glaucoma and ocular surface disease

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INTRODUCTION

Glaucoma and ocular surface disease (OSD) are common comorbid conditions. Glaucoma medications can exacerbate OSD which may decrease treatment adherence resulting in elevated intraocular pressure (IOP) and glaucoma progression. We previously presented a case report that demonstrated an IOP lowering effect of 26-35% when low dose doxycycline was used to treat pre-existing OSD in a glaucoma patient. The purpose of this pilot study is to prospectively evaluate the IOP lowering effect of low dose doxycycline when used as an adjunctive medication for glaucoma.

METHODS

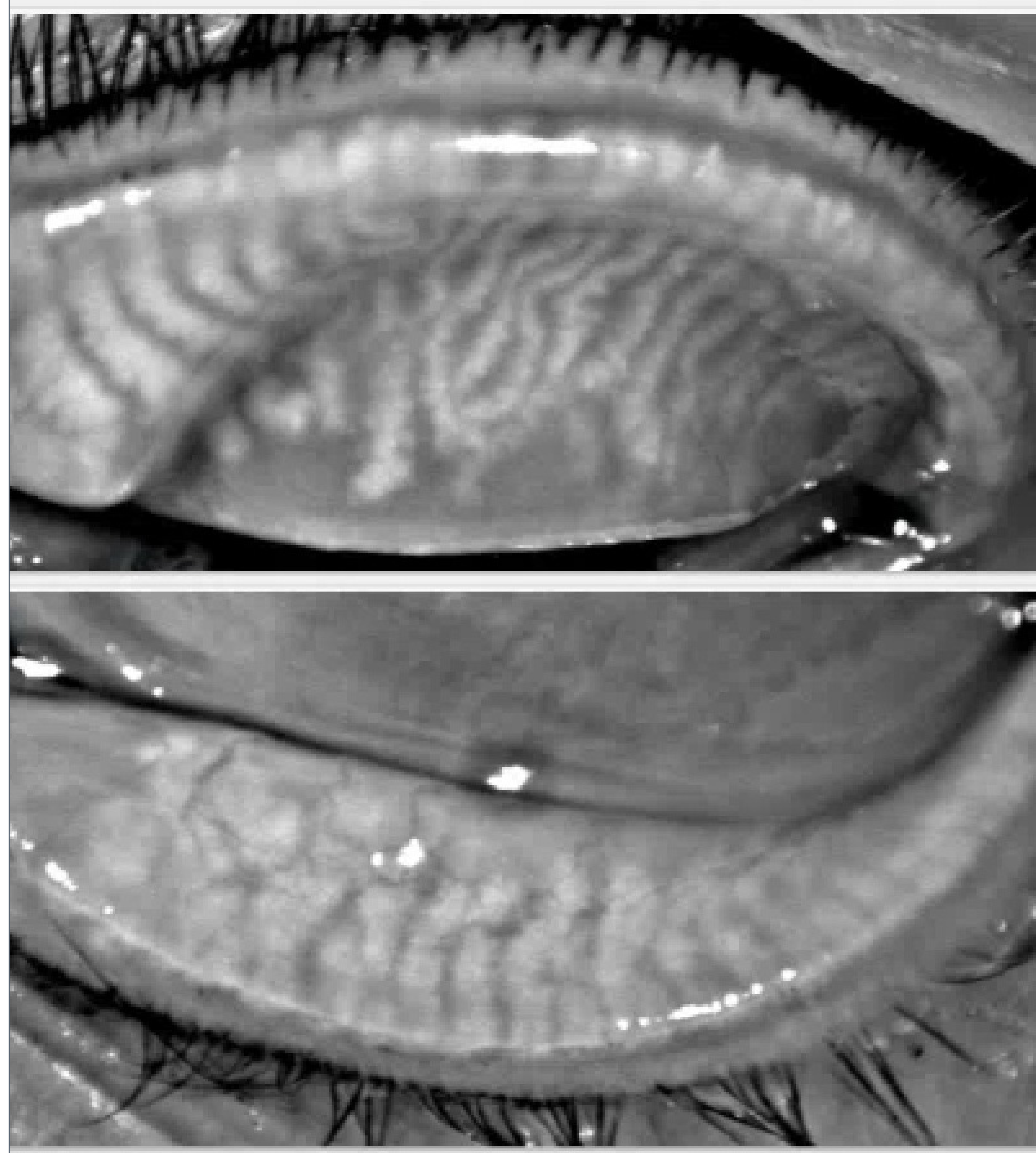
Subjects treated with topical IOP lowering medications for mild or moderate open angle glaucoma (OAG) and who had at least one sign or symptom of OSD (see Image 1) were enrolled in this prospective study at the Illinois Eye Institute (see Table 1). All subjects must have been consistently using their prescribed glaucoma medications, without changes, for at least 18 months, and exhibited <3mmHg IOP variation. Severe OAG, unstable IOP, and history of glaucoma surgery or laser trabeculoplasty were excluded. After informed consent, baseline measurements included visual acuity, slit lamp examination, Goldmann IOP, corneal hysteresis and SPEED questionnaire. Patients continued their prescribed glaucoma medications throughout the study and began doxycycline hyclate 50 mg per day for 3 months. Baseline measurements were repeated at 1-month, 3-months, and 6-months (3 months after discontinuation of doxycycline). Six subjects were analyzed. Right eye was designated as the study eye.

TABLE 1
Patient Demographics

Sex	Age	Diagnosis	Glaucoma tx	Dry Eye tx
F	72	POAG mild OU	latanoprost qhs OU	Systane AT's daily
M	73	NTG mild OU	latanoprost qhs OU	none
M	67	POAG moderate OU	latanoprost qhs OU, dorzolamide-timolol bid OU	none
F	75	POAG mild OD	Travatan Z qhs OU	Refresh AT's prn
F	73	POAG mild OU	Vyzulta qhs OU	none
M	83	POAG mild OU	latanoprost qhs OU	AT's daily, Lumify prn

IMAGE 1

Meibography of the left eye of one study patient prior to course of doxycycline tx. Gland tortuosity, segmentation and dropout present on upper lid and lower lid.



RESULTS

TABLE 2

Mean baseline IOP was 16.0 mmHg $\pm$ 3.58. At 1-month there was 8.31% IOP reduction (mean 14.67 mmHg $\pm$ 3.33, p=0.102). At 3-months, IOP was significantly reduced by 15.63% from baseline (mean 13.5mmHg $\pm$ 3.83, p= 0.007). At 6 months, after discontinuing doxycycline 3 months prior, IOP was 4.38% lower than baseline (mean 15.3 mmHg $\pm$ 3.67, p=0.235).

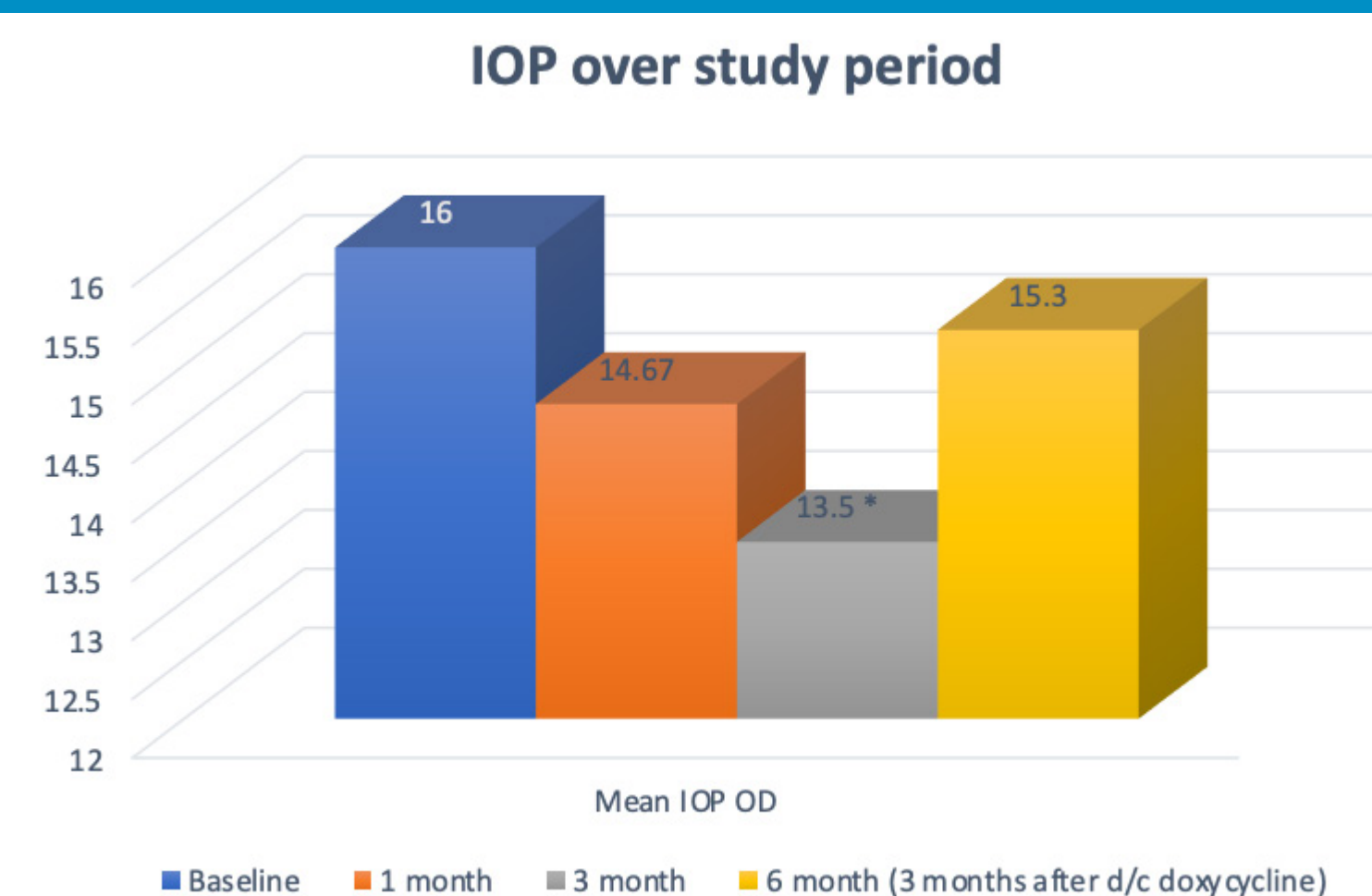


TABLE 3

At 6 months, after discontinuing doxycycline 3 months prior, mean IOP (15.3 mmHg $\pm$ 3.67) was 11.76% significantly higher when compared to mean IOP at 3-months (mean 13.5mmHg $\pm$ 3.83, p= 0.006).

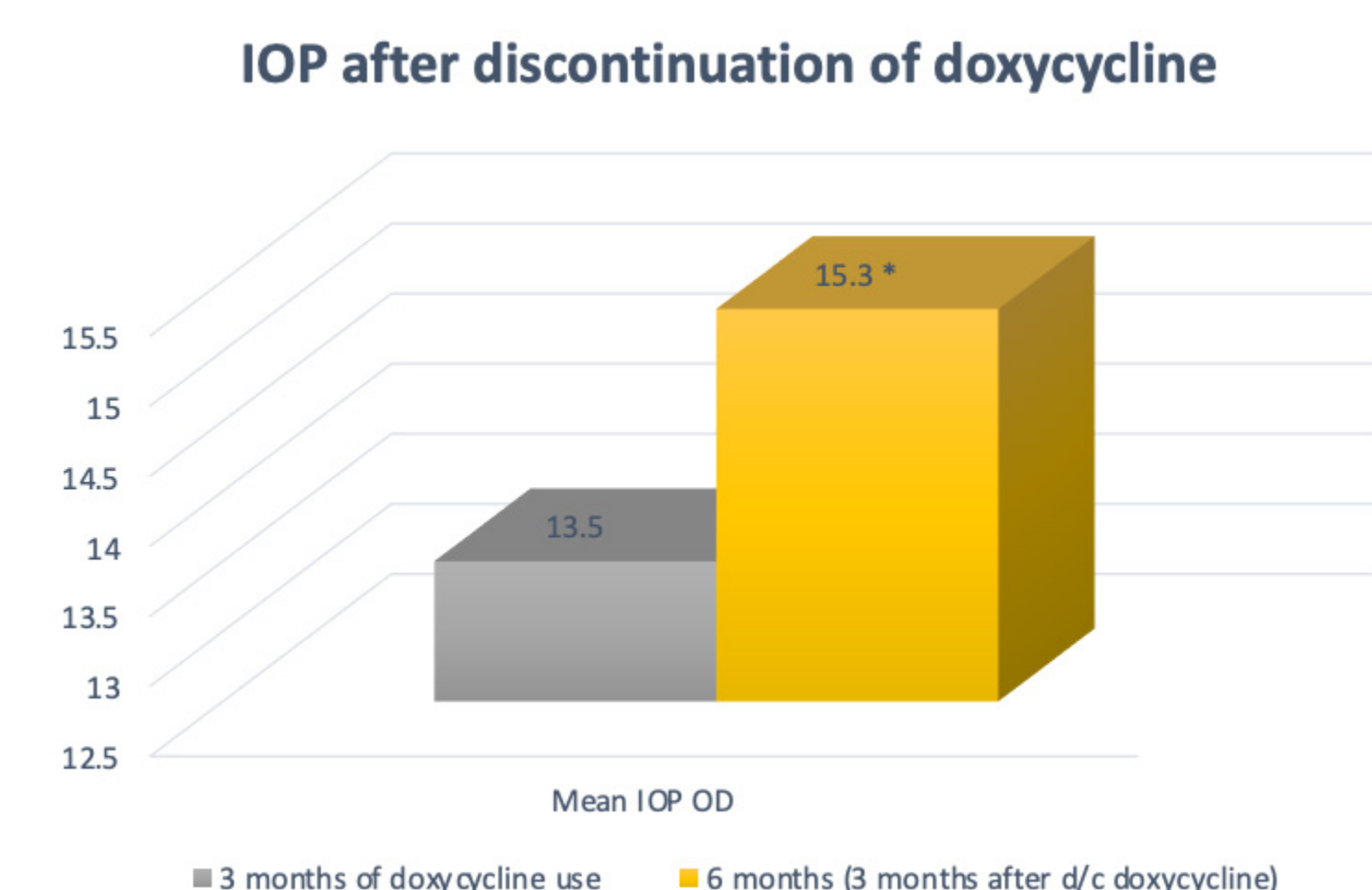
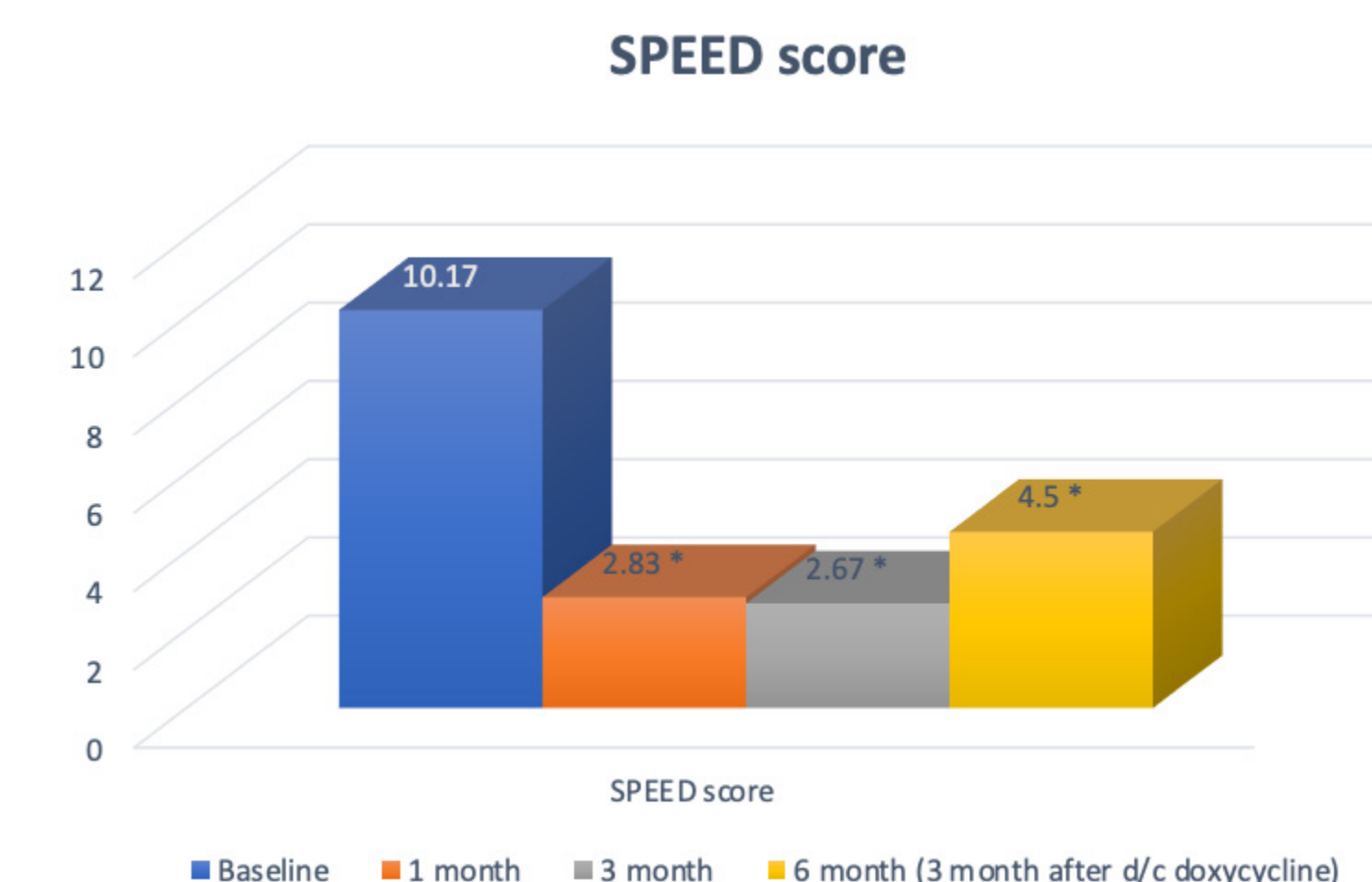


TABLE 4

Mean SPEED score at baseline was 10.17 $\pm$ 7.55. SPEED score decreased significantly at 1-month (mean 2.83 $\pm$ 3.37, p= 0.04), 3-month (mean 2.67 $\pm$ 2.50, p=0.024), and 6-month follow up (mean 4.50 $\pm$ 4.37, p=0.031). SPEED scoring: 1-5 (mild); 6-9 (moderate); 10+ (severe).



CONCLUSIONS

Low dose doxycycline improved SPEED scores and provided significant IOP reduction at 3 months. In low doses, doxycycline exhibits anti-inflammatory effects and is often used for OSD. We postulate that doxycycline's anti-inflammatory effect can also reduce trabecular meshwork (TM) inflammation and reduce TM resistance to outflow. The overall IOP lowering effect was not as high as we previously reported, but the baseline IOP in our previous report was also higher. From our experience, greater pressure reduction is often seen with higher IOPs. Based on this small sample pilot study, low dose doxycycline shows promise as an adjunctive therapy in reducing pressure, particularly in higher IOPs, but additional studies are necessary to confirm these preliminary results.

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