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The excision-generated effect of pterygium on the related corneal astigmatism

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ABSTRACT

This herein-experimental study was purposely designed to understand the excision-generated effect of pterygium on the related corneal astigmatism (CA). This prospective study was conducted on 26 eyes of 18 patients (<53 years old) with a primary-nasal pterygium that had attended Al-Diwaniyah Teaching Hospital, Al-Diwaniyah, Iraq during March 2016 to September 2017. The study involved 26 eyes that had different grades of pterygium (GP), 1 eye (3%) had GP I, 10 eyes (38%) had GP II, 9 eyes had GP III, and 6 eyes had GP IV. The astigmatism degrees vary with the GP. Preoperative means of astigmatism (PrMA) were 1.77+/-0.45 diopter (D) in GP I, 2.64+/0.77D in GP II, 3.65+/-1.53D in GP III, and 5.74+/-2.2D in GP IV. Interestingly, the degrees of astigmatism were decreased significantly post-pterygium removal. The PrMA, 3.45+/1.23, was reduced to postoperative mean astigmatism (PoMA) 1.71+/-0.99D. The preoperative mean of vision (PrMV), 0.5+/-0.4 was improved to 0.6+/-0.4. Corneal astigmatism was decreased after three months following the excisions. The current study concluded that the possible interference of these invasive tissues with the visual axis of the affected eyes. It also provides significant rates of visual improvements after performing these operations. In addition, visual acuity could be enhanced as soon as the surgical removals of these damaging tissues are done.

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INTRODUCTION

Pterygiurn is a triangle-based shape of tissue sheets that are formed via extra growth of connective tissues and blood vessels. These generated tissues spread between two points of the bulbar conjunctiva to the cornea, and that is commonly the nasal form. Hot climatic-based regions, high levels of sun and/or UV lights, are the most places that pterygia could be noticed in (Chui *et al.,* 2011; Hall, 2016). However, ocular dryness, irritation, and dominance (all-time compensatory-opening of eye) are extra etiological factors that could also in- duce pterygiurn (Accorinti *et al.,* 2014; Antony, 2017; Džunić *et al.,* 2010; Essuman *et al.,* 2014; Ishioka *et al.,* 2001; Malekifar *et al.,* 2017). Various degrees of corneal distortion (CD) and corneal astigmatism (CA) can be developed following the occurrence and the progression of pterygium (Avisar *et al.,* 2000; Macarie and Macarie, 2016; Mohammad-Salih and Sharif, 2008; Oh and Wee, 2010). Pterygium-stimulated astigmatism (PA) could be responsible for many cases of visual impairments such as low visual acuity, sensitivity to glare, and monocular diplopia (Panchapakesan *et al.,* 1998). The mechanisms that stand behind PA could be referred to the pterygium-head-based presence of accumulated tears (Chowers *et al.,* 2001; Ergin and Bozdoğan, 2001; Hansen and Norn, 1980; Maheshwari, 2007) and pterygium stimulation of mechanical-based traction on the cornea (Altan-Yaycioglu *et al.,* 2013).

The collagenous- and fibrovascular-targeted degeneration and growth respectively cover the affected part of the ocular epithelium which explains the pathophysiological progression of pterygia (Chui *et al.,* 2008a, 2008b; Dushku *et al.,* 2001). A triangle-based shape of pterygium with the head, apex, touching the cornea and the body distorting the Bowman's layer and the superficial part of the corneal lamellae generates several complications that influence the vision of the affected eyes (Chui *et al.,* 2011).

Patients who present with histories of recent enlargements require early excision for preventing subsequent-aggressive growth. Aggressive growth or atypical appearance should promptly be excised for biopsy (Colorado *et al.,* 2016). Most small lesions are asymptomatic, while irritation and grittiness are caused by a dellen-localized drying-effect at the advancing edge due to interference with the pre-corneal tear film (more likely if the head of the pterygium is elevated) (Lee *et al.,* 2002). Patients who wear contact lenses may develop symptoms of irritation at an early stage due to edge lift. Lesions may interfere with the visualization capability of the affected eyes by obscuring the visual-axis line or generating a condition of astigmatism (Alipour *et al.,* 2017). There could be intermittent inflammation similar to pingueculitis, so cosmesis may be a significant problem. Extensive lesions, particularly if recurrent, may be associated with sub-conjunctival fibrosis extending to the fornices that may cause restricted ocular excursion (Sheppard *et al.,* 2014). A pterygium is made up of three parts: a 'cap' (an avascular halo-like zone at the advancing edge), a head, and a body (Kawano *et al.,* 2011). Linear-epithelial iron-deposition (Stocker line) may be seen in the head-based anterior-part of the epithelium of the cornea (Arai *et al.,* 2017). Fuchs islets are small discrete-whitish flecks that consist of clusters of pterygial-epithelial cells, often present at the advancing edge (Ip *et al.,* 2015).

If pseudopterygium is suspected, there may be a history of a causative episode, and it is classically distinguished by both location away from the horizontal (though this may also be seen with true pterygia) and the firm attachment to the cornea only at its apex, head (Lekhanont *et al.,* 2011).

MATERIALS AND METHODS

In this study, 18 patients (<50 years old) with primary nasal pterygium were pre- and post-operatively studied. Exclusion criteria were pseudopterygium, recurrent pterygium, dry eye, history of an ocular disease predisposing to ulceration, poor-wound healing, herpetic keratitis, acne rosacea. All patients were examined for visual acuity using the snellen chart, refraction slitlamp, and fundus examination before surgery and 3 months after surgery. Grading of pterygium was done according to corneal involvement in which Grade a (just near limbus), Grade b (between limbus and pupil), Grade c (could reach to the pupillary edge), and Graded (covering the pupillary margin) (Anbesse *et al.,* 2017).

All the pterygia were removed by the author under peribulbar anesthesia. After applying butadiene paint, the draping of the eye, fixating of the eyelid retractor, and cutting of conjunctiva with a small incision medial to the head were performed. When the dissection was completed up to the caruncle superior and inferior fornix. The epithelium of the cornea, 2mm anterior to the head, was scraped with a blade, size 15, (Bard-Parker®). The head was avulsed using blunt dissection and traction. Then, the whole body was excised. Conjunctival autografting from superior conjunctiva was taken and sutured to the bed of pterygium with 8-zero absorbable-stich. Following that, eye-patching was applied. On the 1st-postoperative day, the dressing was removed. Ciprofloxacin 0.3% and dexamethasone 0.1%, as eye drops, were used 3 times/day for 2 weeks with follow-up checkups on day 7 and 14 and week 4 for 3 months.

RESULTS AND DISCUSSION

The study involved 26 eyes that had different GPs, 1 eye (3%) had GP I, 10 eyes (38%) had GP II, 9 eyes had GP III, and 6 eyes had GP IV. The astigmatism degrees vary with the GP. PrMAs were 1.77+/-0.45 diopter (D) in GP I, 2.64+/0.77D in GP II, 3.65+/-1.53D in GP III, and 5.74+/-2.2D in GP IV, table 1.

Interestingly, the degrees of astigmatism were decreased significantly post-pterygium removal. The PrMA, 3.45+/1.23, was reduced to PoMA, 1.71+/-0.99D. The PrMV, 0.5+/-0.4 was improved to 0.6+/-0.4. Corneal astigmatism was decreased after three months following the excisions, table 2.

Visual acuity was improved in 40% of patients. No improvements were noticed in the rest, 60%.

Pterygium can cause significant corneal astigmatism. Generally, it causes local flattening, center to the apex, (Altan-Yaycioglu *et al.,* 2013; Pavilack and Halpern, 1995). Because it was a horizontal-meridian-based flattening, the result agreed with the astigmatism criteria (Ashaye, 1990; Soriano *et al.,* 1993) of hemi-meridional on the nasal side (Fong *et al.,* 1998; Maheshwari, 2003). It has been proposed that PA caused due to the pterygium-head-based presence of accumulated tears. The mechanism, here, was tear-meniscus formation between pterygium and a corneal apex that results in flattening of natural corneal curvature.

Table 1: Grade of pterygium and astigmatism

GP	Patients (n and %)	PrMA+/-SD	PoMA+/-SD
I	1 (3%)	1.77+/-0.45D	0.88+/-0.57D
II	10 (38%)	2.64+/-0.77D	1.36+/-1.12D
III	9 (34%)	3.65+/-1.53D	1.38+/-1.17D
IV	6 (23%)	5.74+/-2.2D	3.22+/-1.12D

Table 2: Astigmatism following the removal of pterygia

	PrMA+/-SD	PoMA+/-SD
Refractive astigmatism	3.45+/-1.23 D	1.71+/-0.99D

Table 3: Visual acuity following the removal of pterygia

	Preoperative mean +/-SD	Postoperative mean +/-SD
BCVA	0.54+/-0.34	0.71+/-0.43

Another postulated mechanism for astigmatism is traction on the corneal surface via pterygial-fibrovascular tissue-growth as sometimes, it could limit duction. There is a significant link between GP and the severity of astigmatism. It has a minimal effect on corneal center until it reaches 45% of the corneal radius (Lin and Stern, 1998). The induced astigmatisms were reduced noticeably following the removal of pterygia. The PrMA was 3.45+/1.23 reduced to 1.71+/-0.99D. The PrMV, 0.5+/-0.4 was improved to 0.6+/-0.4. The improvements could have been induced due to a decrease in the astigmatisms via the removal of pterygia from the visual axis, GP IV.

The resulted effect of these pterygial removals from the affected eyes on the corneal astigmatisms was improved after 3 months following these excisions. The rationale that stands behind these improvements could be explained that no permanent complications such as distortion to the ocular-based points of the visual axis were produced, and thus the removals of these pterygia were enough to generate such improvements to the corneal astigmatisms in the affected eyes. The current study results agree with (Altan-Yaycioglu *et al.,* 2013) that found that astigmatisms related to the occurrence of pterygia were improved after surgical removals of these invasive tissues.

The current study results also showed improvement in the visual acuity following the removals of these pterygial tissues. The PrMV, 0.5+/-0.4 was improved to 0.6+/-0.4, and this could be identified as a major reason for the successful effect of these surgical operations. these results agree with (Bhandari *et al.,* 2015) that detected visual improvements after such surgical removals of pterygia. The herein improvements after these operations also indicate no major complications were generated in influenced spots. This piece of information agrees with (Bhandari *et al.,* 2015) that recognized only minor complications, such as congestion after these types of surgeries were performed.

CONCLUSION

In the current-performed study, the results of the pterygial-surgical removals successfully satisfy the purpose of this study. The results show improvements to the corneal astigmatisms following these removals. This indicates the possible interference of these invasive tissues with the visual axis of the affected eyes. It also provides significant rates of visual improvements after performing these operations. In addition, visual acuity could be enhanced as soon as the surgical removals of these damaging tissues are done.

REFERENCES

Accorinti, M., Gilardi, M., Giubilei, M., De Geronimo, D., Iannetti, L., 2014. Corneal and scleral dellen after an uneventful pterygium surgery and a febrile episode. Case Rep. Ophthalmol. 5, 111–5.

Alipour, F., Khaheshi, S., Soleimanzadeh, M., Heidarzadeh, S., Heydarzadeh, S., 2017. Contact Lens-related Complications: A Review. J. Ophthalmic Vis. Res. 12, 193–204.

Altan-Yaycioglu, R., Kucukerdonmez, C., Karalezli, A., Corak, F., Akova, Y.A., 2013. Astigmatic changes following pterygium removal: comparison of 5 different methods. Indian J. Ophthalmol. 61, 104–8.

Anbesse, D.H., Kassa, T., Kefyalew, B., Tasew, A., Atnie, A., Desta, B., 2017. Prevalence and associated factors of pterygium among adults living in Gondar city, Northwest Ethiopia. PLoS One 12, e0174450.

Antony, D.A.T., 2017. Pterygium and Dry Eye- A Clinical Correlation. J. Med. Sci. Clin. Res. 5, 23654–23659.

Arai, Y., Makino, S., Obata, H., 2017. Stocker's line in pterygium. J. Gen. Fam. Med. 18, 92–93.

Ashaye, A.O., 1990. Refractive astigmatism and pterygium. Afr. J. Med. Med. Sci. 19, 225–8.

Avisar, R., Loya, N., Yassur, Y., Weinberger, D., 2000. Pterygium-induced corneal astigmatism. Isr. Med. Assoc. J. 2, 14–5.

Bhandari, V., Rao, C.L., Ganesh, S., Brar, S., 2015. Visual outcome and efficacy of conjunctival autograft, harvested from the body of pterygium in pterygium excision. Clin. Ophthalmol. 9, 2285–90.

Chowers, I., Pe'er, J., Zamir, E., Livni, N., Ilsar, M., Frucht-Pery, J., 2001. Proliferative activity and p53 expression in primary and recurrent pterygia. Ophthalmology 108, 985–8.

Chui, J., Coroneo, M.T., Tat, L.T., Crouch, R., Wakefield, D., Di Girolamo, N., 2011. Ophthalmic pterygium: a stem cell disorder with premalignant features. Am. J. Pathol. 178, 817–27.

Chui, J., Di Girolamo, N., Wakefield, D., Coroneo, M.T., 2008a. The pathogenesis of pterygium: current concepts and their therapeutic implications. Ocul. Surf. 6, 24–43.

Chui, J., Girolamo, N. Di, Wakefield, D., Coroneo, M.T., 2008b. The Pathogenesis of Pterygium: Current Concepts and Their Therapeutic Implications. Ocul. Surf. 6, 24–43.

Colorado, L.H., Pritchard, N., Cronin, B.G., Efron, N., 2016. Characterization of Goblet Cells in a Pterygium Biopsy Using Laser Scanning Confocal Microscopy and Immunohistochemistry. Cornea 35, 1127–1131.

Dushku, N., John, M.K., Schultz, G.S., Reid, T.W., 2001. Pterygia Pathogenesis. Arch. Ophthalmol. 119, 695.

Džunić, B., Jovanović, P., Veselinović, D., Petrović, A., Stefanović, I., Kovačević, I., 2010. Analysis of pathohistological characteristics of pterygium. Bosn. J. basic Med. Sci. 10, 307–13.

Ergin, A., Bozdoğan, Ö., 2001. Study on Tear Function Abnormality in Pterygium. Ophthalmologica 215, 204–208.

Essuman, V.A., Ntim-Amponsah, C.T., Vemuganti, G.K., Ndanu, T.A., 2014. Epidemiology and recurrence rate of pterygium post excision in Ghanaians. Ghana Med. J. 48, 39–42.

Fong, K.S., Balakrishnan, V., Chee, S.P., Tan, D.T., 1998. Refractive change following pterygium surgery. CLAO J. 24, 115–7.

Hall, A.B., 2016. Understanding and managing pterygium. Community eye Heal. 29, 54–56.

Hansen, A., Norn, M., 1980. Astigmatism and surface phenomena in pterygium. Acta Ophthalmol. 58, 174–81.

Ip, M.H., Chui, J.J., Tat, L., Coroneo, M.T., 2015. Significance of Fuchs Flecks in Patients With Pterygium/Pinguecula. Cornea 34, 1560–1563.

Ishioka, M., Shimmura, S., Yagi, Y., Tsubota, K., 2001. Ptyerygium and Dry Eye. Ophthalmologica 215, 209–211.

Kawano, H., Kawano, K., Sakamoto, T., 2011. Separate limbal-conjunctival autograft transplantation using the inferior conjunctiva for primary pterygium. Oman J. Ophthalmol. 4, 120–4.

Lee, A.J., Lee, J., Saw, S.-M., Gazzard, G., Koh, D., Widjaja, D., Tan, D.T.H., 2002. Prevalence and risk factors associated with dry eye symptoms: a population based study in Indonesia. Br. J. Ophthalmol. 86, 1347–51.

Lekhanont, K., Patarakittam, T., Mantachote, K., Waiyawatjamai, P., Vongthongsri, A., 2011. Progressive Keratolysis with Pseudopterygium Associated with Erythema Elevatum Diutinum. Ophthalmology 118, 927–933.

Lin, A., Stern, G., 1998. Correlation between pterygium size and induced corneal astigmatism. Cornea 17, 28–30.

Macarie, S.S., Macarie, D.M., 2016. Conjunctival autograft in pterygium treatment. Rom. J. Ophthalmol. 60, 170–173.

Maheshwari, S., 2003. Effect of pterygium excision on pterygium induced astigmatism. Indian J. Ophthalmol. 51, 187–8.

Maheshwari, S., 2007. Pterygium-induced corneal refractive changes. Indian J. Ophthalmol. 55, 383–6.

Malekifar, P., Esfandiari, H., Behnaz, N., Javadi, F., Azish, S., Javadi, M.A., Kalantarion, M., 2017. Risk Factors for Pterygium in Ilam Province, Iran. J. Ophthalmic Vis. Res. 12, 270–274.

Mohammad-Salih, P.A.-K., Sharif, A.F.M.D., 2008. Analysis of Pterygium Size and Induced Corneal Astigmatism. Cornea 27, 434–438.

Oh, J.Y., Wee, W.R., 2010. The effect of pterygium surgery on contrast sensitivity and corneal topographic changes. Clin. Ophthalmol. 4, 315–9.

Panchapakesan, J., Hourihan, F., Mitchell, P., 1998. Prevalence of pterygium and pinguecula: the Blue Mountains Eye Study. Aust. N. Z. J. Ophthalmol. 26 Suppl 1, S2-5.

Pavilack, M.A., Halpern, B.L., 1995. Corneal topographic changes induced by pterygia. J. Refract. Surg. 11, 92–5.

Sheppard, J.D., Mansur, A., Comstock, T.L., Hovanesian, J.A., 2014. An update on the surgical management of pterygium and the role of loteprednol etabonate ointment. Clin. Ophthalmol. 8, 1105–18.

Soriano, J.M., Janknecht, P., Witschel, H., 1993. [Effect of pterygium operation on preoperative astigmatism. Prospective study]. Ophthalmologe 90, 688–90.