# Pterygium and induced astigmatism

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# ظفرة العين ولانقطية القرنية

**الهدف من الدراسة:** هو تحديد العلاقة بين حجم ظفرة العين و اللانقطية او انحراف القرنية (الاستكماتزم) . وللوصول إلى استنتاج إن انحراف القرنية الناتج عن ظفرة العين هو احد العوامل المطلوبة لإجراء جراحة رفع الظفرة .
**طريقة البحث:** اشتملت الدراسة على تسعين مريض مصاب بظفرة القرنية الابتدائية وفى عين واحدة وبمختلف الأحجام . لقد تم تقسيم المرضى إلى ثلاث مجموعات حسب حجم الظفرة (اقل من ٢ملم-٢ الى٤ ملم واكثر من٤ملم) والذي تم قياسه باستخدام جهاز الضوء الشقي (سلت لامب) بوحدة المليمتر بداية من منطقة اتصال القرنية من جهة والصلبة والملتحمة من الجهة الثانية .

- تم استخدام جهاز فحص طبوغرافية القرنية لتحديد درجة اللانقطية نظرياً .
- تم تحديد درجة اللانقطية عمليا وتصحيحه بواسطة العوينات .

**النتائج :** لقد تم تشخيص انحراف القرنية المحسوس والمؤثر على درجة الرؤيا عند خمسة عيون (١٦.٦%) من المجموعة الأولى وثمانية عشر عين (٤٧.٣%) من المجموعة الثانية وعشرون عين (٩٠.٩% ) من المجموعة الثالثة .
**الخلاصة :** أظهرت الدراسة إن هناك علاقة بين ازدياد حجم الظفرة وحدوث وازدياد درجة انحراف القرنية (الاستكماتزم) وخصوصا عندما يكون حجم الظفرة أكثر من ٢مليمتر ولذلك فانه يتحتم علينا إجراء جراحة رفع الظفرة عندما يتعدى حجمها المليمترين تلافياً لحدوث ضعف في حدة البصر لدى المرضى بسبب اللانقطية الناجمه عن الظفرة.

**Abstract**

**Background**:There is an association between increasing size of pterygium and the degree of induced corneal astigmatism.
**Objectives:** To assess the relation between pterygium size and induced corneal astigmatism and to conclude whether astigmatism secondary to pterygium is an indication for surgery.
**Methods:** Ninety patients were included in this study with primary unilateral pterygium of different sizes, we evaluate pterygium using:

- Slit-lamp beam measurements of size of pterygium (in millimeters) from the limbus.
- Corneal topography using OPD (SCAN II NIDEK).
- Best corrected visual acuity was determined using Snellen's chart and subjective clinical refraction.

**Results:** Primary pterygium induces with-the-rule astigmatism, significant astigmatism was found in 5 (16.6%) of eyes with pterygium size less than 2 mm and in 18 (47.3%) of eyes with pterygium of 2-4mm in size. 20 (90.9%) of eyes with pterygium of more than 4 mm in size showed significant astigmatism**.**
**Conclusions:** When primary pterygium reaches more than 2mm in size from the limbus, it induces astigmatism( $\geq$ 1.0 diopter) this astigmatism tends to increase with any increase in the size of the lesion.

**Recommendations:** According to the results of our study, early surgical removal of pterygium is indicated when the lesion is more than 2mm from the limbus to correct clinically significant pterygium induced astigmatism.
**Keywords**: pterygium, astigmatism.

## Introduction

Pterygium is a triangular fibro vascular sub-epithelial ingrowth of degenerated bulbar conjunctival tissue over the limbus on to the cornea.[1]The pathophysiology of pterygia is characterized by elastotic degeneration of collagen and fibrovascular proliferation, with an overlying covering of epithelium. The pterygium may invade the superficial peripheral cornea (with the apex of the lesion towards the cornea) , beneath the body of the lesion there may be destruction of Bowman's layer and the superficial corneal lamellae.As it moves towards the pupillary area it can eventually cause corneal distortion and visual loss.[2] Pterygia may be classified as active or inactive. An inactive pterygium shows little or no evidence of progression over a long period. Conversely, an active pterygium behaves in a far more aggressive fashion, with an advancing margin of grayish opacification and hyperemia within the tissue. The progression of a pterygium onto the cornea can lead to both significant corneal distortion and the development of large amount of corneal astigmatism. Pterygium-induced astigmatism can be the cause of subjective visual complaints, including decreased visual acuity, glare sensitivity and monocular diplopia.[3]Several mechanisms have been suggested to explain the induced astigmatism. These include: (a) pooling of the tear film at the leading edge of the pterygium.(b) mechanical traction exerted by the pterygium on cornea. [4,5,6] Pterygium leads to a considerable effects on corneal refractive status which is measured by refraction. [7,8] Such effects increase with the increase in the grade of pterygia. Pterygium induced astigmatism and involvement of the visual axis by the invading pterygium remains one of the important indications for pterygium surgery as this can result in significant visual impairment. [9]

We conducted this study to assess the relation between pterygium size and induced corneal astigmatism and to conclude whether astigmatism secondary to pterygium is an indication for surgery.

## Material and Methods

We assessed (90) eyes of (90) patients with unilateral primary pterygium of different sizes ranging from (0.2) mm up to more than (4.0) mm of the cornea and involving the visual axis, we divided the eyes into (3) groups according to the size of pterygium.

Group 1 (G1): Consists of (30) eyes with pterygium size less than 2 mm.

Group 2 (G2): Consists of (38) eyes with lesion more than 2 mm and less than 4 mm.

Group 3 (G3): Consists of (22) eyes with lesion more than 4 mm in size and involving visual axis.

Subjective refraction with best corrected visual acuity using (Snellen's) chart test was estimated to note the degree of significant astigmatism subjectively, size of the lesion was measured in mm from the limbus by slit lamp beam of (Hag Streit 900) slit-lamp biomicroscope. Objective astigmatism was diagnosed by using (OPD SCANII NIDEK).

Quantitative data of induced astigmatism were evaluated by chi-square analysis. A (P value) of 0.05 was considered the upper limit of statistical significance.

**Results**

Pterygium lesion induces refractive changes and often leads to visual impairment, our study shows that pterygium induces with the rule astigmatism Fig.(1) in (60%) of patients and (40%) of patients presented against the rule or oblique astigmatism.

With increasing size of pterygium there is an increase in the degree of astigmatism which is shown by corneal topography results (Table I), or by subjectively measured astigmatism that was clinically corrected by glasses (Table II). P value indicates that the difference is significant if we compare the results of both groups 2 and 3 to group 1.

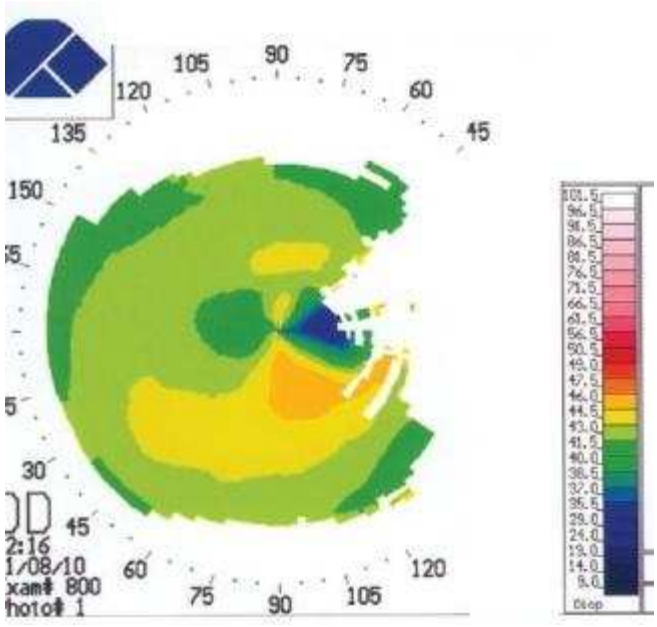


Figure (1): with the rule astigmatism induced by pterygium

**TABLE I: Grades of pterygium and topographic indices**

| No. of eyes with pterygium | | topographic astigmatism /diopters |
|---|---|---|
| G 1 | 30 | 1.0 ±1.8 |
| G 2 | 38 | 3.8 ±2.8 |
| G 3 | 22 | 6.1 ±2.2 |

**TABLE II:** Pterygium induced subjective astigmatism (clinically can be corrected with glasses)

| | No. of eyes | No. of eyes with astigmatism of ≥ 1 diopter | P value |
|---|---|---|---|
| G 1 | 30 | 5 (16.6%) | |
| G 2 | 38 | 18 (47.3%) | 0.0001* |
| G 3 | 22 | 20 (90.9%) | 0.001* |

P* is significant

## Discussion

Pterygium induces corneal astigmatism. Astigmatism of eyes with pterygium was found to be greater than that of normal human eyes [4,10-12] . LIN and STERN found a significant correlation between the pterygium size and corneal astigmatism, they reported that pterygium induces significant degrees of corneal astigmatism once it exceeded (>45%) of the radius of the cornea or within (3.2) mm of visual axis . [13]

Pterygium in our patients was seen to have considerable effect on topographic indices shown by keratometric measurements (table I), flattening was seen in horizontal meridian which was associated with astigmatism (with-the-rule) in 60% of patients. The exact mechanism of flattening is not clear, it is thought that astigmatism is mainly caused by the formation of tear meniscus between the corneal apex and the elevated pterygium causing apparent flattening of the normal corneal curvature. [14]As it is learned from the histopathological features of the pterygium, corneal invasion and subsequent destruction of the anterior stromal lamellae may cause flattening or changes in the corneal curvatures leading to subsequent astigmatism that could be detected clinically while determining the subjective clinical refraction.

Our study showed that clinically significant astigmatism (astigmatism causing visual impairment which could be corrected by glasses) is induced by pterygium of more than (2) mm size from the limbus, this tends to increase significantly with increasing size of the pterygium and in turn leads to impairment of vision. In other words, the extension of pterygium is significantly correlated with the degree of corneal astigmatism with higher percentage of with the rule astigmatism , therefore surgical intervention of pterygium is indicated when the size of the lesion is more than 2mm from the limbus.

## Conclusion and Recommendation

- Once primary pterygium reaches more than (2) mm in size from the limbus it induces clinically significant astigmatism (≥1 diopter), this astigmatism tends to increase with any increase in the size of pterygium leading to impairment of visual acuity. Early surgical removal of the lesion may be beneficial when its size is exceeding (2) mm from the limbus.
- Computerized video-keratography is the best tool in evaluating pterygium associated corneal changes as keratometry measures only the central cornea and peripheral cornea is ignored.

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