

PREVALENCE OF KERATOCONUS IN PATIENT COMING FOR LASIK FOR CORRECTION OF MYOPIA OR MYOPIC ASTIGMATISM

By

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ABSTRACT

Background: Keratoconus (KC) is a corneal collagen disorder in which the central portion of the cornea becomes thinner and bulges forward in a cone-shaped fashion resulting in myopia, irregular astigmatism, and eventually visual impairment.

Objective: Use of Pentacam topography to detect the prevalence of keratoconus and keratoconus suspect in patients coming for LASIK for correction of myopia and myopic astigmatism.

Patients and methods: A retrospective non-randomized clinical study included 1000 eyes of 500 patients coming for LASIK for correction of myopia and myopic astigmatism. All patients had undergone full ophthalmic history, history of ocular surgeries, complete ophthalmic examination (visual acuity, uncorrected visual acuity (UCVA) & best corrected visual acuity (BCVA), anterior segment examination using Slit-lamp biomicroscopy, intraocular pressure (IOP) measurement by applanation tonometry and fundus examination. In this retrospective clinical study, data from Pentacam (Allegro Oculyzer) such as K readings, corneal thickness, thinnest location and cylinder was retrieved from patient's records coming for LASIK in the period from August 2018 to July 2019 to detect keratoconus and keratoconus suspect.

Results: In our study, there was high prevalence of keratoconus. It was 6.6 %, which was more than the commonly cited figures of (0.05–0.23%) for western countries. Conclusion: This study showed that the prevalence of keratoconus in patients seeking refractive surgery was 6, 6 % and the incidence of keratoconus suspect was 2, 6 %, this high incidence of keratoconus in these sample groups reflects the high incidence of keratoconus in the general population of Middle East countries compared with the western countries.

Keywords: Keratoconus, Deep anterior lamellar keratoplasty, Laser in situ keratomileusis, Penetrating keratoplasty.

INTRODUCTION

Keratoconus has been classically described as bilateral asymmetrical progressive ectatic condition of the cornea leading to thinning of the cornea and irregular astigmatism. The etiopathogenesis is still under research and it may be the final manifestation of diverse pathologic processes. With better

understanding of the disease and new imaging modalities as well as the advent of refractive surgery, it is being diagnosed much more often and much earlier than in the past (*Nikhil, 2013*).

The natural history of disease is variable. Typically, at about the age of puberty, the keratoconic process starts and usually. Over a period of next 10-20

years, the process continues until the progression gradually stops (*Naderan et al., 2015*). The severity of the disorder at the time the progression stops can range from very mild irregular astigmatism to severe thinning, protrusion, and scarring requiring keratoplasty (*Coskunseven et al., 2013*).

Despite the major advances in diagnosing and managing keratoconus, the cause of KC is still not confirmed. Many suggest that it is multifactorial, various genes, proteinases, and environmental factors have been implicated in its etiology. Although classically defined as a predominantly degenerative disease, with mechanically induced trauma accelerating its course, however accumulating evidence suggests a pivotal role for inflammation in the pathophysiology of KC. Several reports have linked various inflammatory mediators (cytokines) with KC (*Wisse et al., 2015*).

Eye rubbing is strongly linked with keratoconus (*Wei et al., 2011*). Environmental factors may contribute to the wide variation in prevalence. Geographical locations with plenty of sunshine and hot weather such as India (*Kulkarni et al., 2016*). In addition, Middle East have higher prevalence than locations with cooler climates and less sunshine such as Finland, Denmark, Minnesota and Japan (*Millodot et al., 2015* and *Murphy et al., 2015*).

PATIENTS AND METHODS

This study was conducted in Ophthalmology Department, Al Hussein University Hospital, Faculty of Medicine, Al-Azhar University, Nour Al-Haya Center and Royah Center.

This was a retrospective non-randomized clinical study included 1000 eyes of 500 patients coming for LASIK for correction of myopia and myopic astigmatism.

Time from: August 2018- July 2019.

Inclusion criteria:

Patients with myopia or myopic astigmatism, age ranging from 18-40 years with clear cornea no previous ocular surgeries.

Exclusion criteria:

Age less than 18 years or more than 40 years, systemic diseases which contraindicate LASIK, increase intraocular pressure and any corneal scar or degeneration or clinical evidence of keratoconus by Slit Lamp.

In this retrospective clinical study, data from Pentacam (Allegro Oculyzer) such as K readings, corneal thickness, thinnest location and cylinder was retrieved from patient's records coming for LASIK in the period from August 2018 to July 2018 to detect Keratoconus and Keratoconus suspect.

Statistical analysis:

Data were qualitatively represented as number, percentage and quantitatively represented by mean \pm SD. Difference and association of qualitative variable was by Chi square test (X²) and differences between quantitative independent multiple was by ANOVA or Kruskal Wallis. P value at <0.05 was considered significant.

RESULTS

This study included 1000 eyes of 500 patients and the result showed that the prevalence of keratoconus was 6.6% and suspected 2.6% and normal 90.8% (Table 1).

Table (1): Prevalence of keratoconus was 6.6% and suspected 2.6% and normal 90.8%

Prevalence	N	%
Normal	908	90.8
Suspected Keratoconus	26	2.6
Keratoconus	66	6.6
Total	1000	100.0

Male were more than half in suspected and in keratoconus group while only 39% among normal group with no significant difference among groups (Table 2).

Table (2): Gender distribution between different groups

Keratoconus		Normal	Suspect	Keratoconus	Total	P
Gender						
Male	N	177	7	18	202	0.12
	%	39.0%	53.8%	54.5%	40.4%	
Female	N	277	6	15	298	
	%	61.0%	46.2%	45.5%	59.6%	
Total	N	454	13	33	500	
	%	100.0%	100.0%	100.0%	100.0%	

Regarding age distribution between studied groups there was no significant difference among groups regard age as normal group age was distributed as 27.4±4.7 and suspected 28.15±1.62 and keratoconus 28.93±6.51 (Table 3).

Regarding K1 distribution among groups there was significant difference among groups regard K1 as normal group was significantly lower 41.94±3.15 and suspected 45.5±2.54 and keratoconus 47.92±4.78 (Table 3). Regarding K2 distribution among groups there was significant difference among groups regard K2 as normal group was

significantly lower 44.94±3.29 and suspected 48.5±2.55 and keratoconus 50.16±5.23 (Table 3).

There was significant difference among groups regard K average as normal group was significantly lower 43.44±3.16 and suspected 47.0±2.58 and Keratoconus 49.04±4.76 (Table 3).

Regarding thinnest location distribution, there was significant difference among groups regard as normal group was significantly higher 544.09±64.36 and suspected 467.42±24.16 and keratoconus 443.51±54.48 (Table 3).

Table (3): Age, K1, K2, K average and thinnest location distribution between studied groups

Parameters		Mean \pm Std. Deviation	Minimum	Maximum	P
Age	Normal	27.4053 \pm 4.76036	19.00	40.00	0.192
	Suspect	28.1538 \pm 1.62512	25.00	29.00	
	Keratoconus	28.9394 \pm 6.51412	21.00	38.00	
K1	Normal	41.9427 \pm 3.15722	35.00	52.00	0.00*
	Suspect	45.5000 \pm 2.54951	41.00	49.00	
	Keratoconus	47.9242 \pm 4.78559	38.00	56.00	
K2	Normal	44.9427 \pm 3.29722	38.00	55.00	0.00*
	Suspect	48.5000 \pm 2.55987	44.00	52.00	
	Keratoconus	50.1667 \pm 5.23874	41.00	59.00	
K average	Normal	43.4427 \pm 3.16722	36.50	53.50	0.00*
	Suspect	47.0000 \pm 2.58951	42.50	50.50	
	Keratoconus	49.0455 \pm 4.76827	39.50	57.50	
Thinnest location	Normal	544.0914 \pm 64.36224	410.00	670.00	0.00*
	Suspect	467.4231 \pm 24.16307	411.00	490.00	
	Keratoconus	443.5152 \pm 54.48055	387.00	602.00	

There was significant difference among groups regard cylinder as normal group was significantly higher -1.41 ± 0.58 and

suspected -2.86 ± 0.92 and keratoconus -3.74 ± 1.61 (Table 4).

Table (4): Cylinder distribution among studied groups

Parameters Cylinder	Mean \pm Std. Deviation	Median	Minimum	Maximum	Kruskal Walis	P
Normal	-1.418 ± 0.585	-1.35	-3.60	-0.66	371.55	0.00*
Suspect	-2.868 ± 0.926	-2.75	-4.20-	-1.32		
Keratoconus	-3.740 ± 1.616	-3.85	-6.20-	-1.70		

DISCUSSION

The total prevalence of keratoconus entirely differed according to the geographical location. *Michel et al. (2011)* described that the prevalence was 0.3 per 100.000 in Russia. *Kulkarni et al. (2016)* stated that it is usually associated with hot climate and low socioeconomic state of the population. In addition, the frequency of attacks of eye allergy with subsequent eye rubbing has a significant role in

development of keratoconus. *Sedarogullari et al. (2013)* made a study on candidates for refractive surgery in Turkey and found a prevalence of 8.1%.

Ethnic differences may account for the differences in the reported prevalence of keratoconus. The reports of two surveys in the UK indicate prevalence 4.4 and 7.5 times greater for Asian (Indian, Pakistani and Bangladeshi) subjects compared with white Caucasians. *Hashemi et al. (2013)*.

In our study, the prevalence of the disease in patients seeking refractive surgery Prevalence of keratoconus was 6.6% and suspected 2.6%. This was considered high prevalence.

Concerning age distribution in relation to grade of keratoconus, *Aylin et al. (2011)* found that the distribution ratios of keratoconic eyes in younger (21 years), middle (21-40 years), and older (>40 years) age groups were 17.2%, 75.3%, and 7.5%, respectively.

Bariah et al. (2012) found that the distribution ratios of keratoconic eyes were 71.1% of males and 28.9% of females. In our study, there was no significant difference among groups as regard age.

Regarding sex distribution of keratoconus, *Aylin et al. (2011)* documented that the distribution ratios of those of patients according to their genders were 37.8% for women and 22% for men.

In our study, male were more than half in suspected and in Keratoconus group, while only 39% among normal group with no significant difference among groups.

David et al. (2011) found a strong "expected" relationship between thinner cornea and keratoconus.

In our study, there was a significant difference among groups regard K average.

CONCLUSION

Our study showed that the incidence of keratoconus in patients seeking refractive surgery was 6, 6 % and the incidence of keratoconus suspect was 2, 6 %, this high incidence of keratoconus in these sample

groups reflects the high incidence of keratoconus in the general population of Middle East countries compared with the western countries.

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معدل إنتشار القرنية المخروطية في المرضى القادمين لعمل عملية تصحيح إبصار لتصحيح قصر النظر أو قصر النظر مع اللانقضية (الإستجماتزم)

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خلفية البحث: القرنية المخروطية عبارة عن اضطراب يصيب العين، حيث تحدث تغييرات هيكلية داخل القرنية يصبح فيه الجزء الأوسط من القرنية أقل سماكة ويحدث انبعاج إلى الامام بطريقة مخروطية الشكل مما يؤدي إلى قصر البصر، وعدم الانتظام اللابؤري، وفي نهاية المطاف يصحبها تغيير شكلها إلى شكل مخروطي أكثر من الشكل الطبيعي. يعد مرض القرنية المخروطية من الأمراض الشائعة التي تؤدي إلى ضعف تدريجي بالنظر، وقد ازداد تشخيصه في الفترة السابقة بمعدلات أكبر من ذي قبل لتوافر وسائل التشخيص الحديثة كرسم القرنية. السبب الحقيقي لحدوث القرنية المخروطية لم يتم معرفته بعد، ولكن وجد أن معدل حدوث المرض يزداد مع وجود بعض العوامل مثل العوامل البيئية كوجود حساسية مزمنة بالعين وما صاحبها من هرش بالعين، أو التعرض للأشعة فوق بنفسجية، أو وجود تاريخ مرضي في العائلة للقرنية المخروطية.

الهدف من البحث: استخدام التصوير المقطعي للبنتاكام للكشف عن انتشار القرنية المخروطية والقرنية المخروطية المشتبه بهم في المرضى القادمين لليزك لتصحيح قصر النظر والإستجماتزم قصر النظر.

المرضي وطرق البحث: شملت الدراسة السريرية غير العشوائية المرضى القادمين لعملية تصحيح قصر النظر والإستجماتزم قصر النظر. خضع جميع المرضى للفحص الكامل للعين (حده البصر، فحص الجزء الامامي للعين باستخدام المصباح الشقي، قياس ضغط العين وفحص قاع العين). وتم استخدام التصوير المقطعي للبنتاكام للكشف عن انتشار القرنية المخروطية.

النتائج: معدل انتشار مرض القرنية المخروطية في الأشخاص المرشحين لعمل جراحات تصحيح عيوب الابصار يبلغ ٦,٦% .

الاستنتاج: أظهرت هذه الدراسة ان معدل انتشار القرنية المخروطية في المرضى الذين يبحثون عن الجراحة الانكسارية كان ٦,٦% ومعدل انتشار القرنية المخروطية المشتبه به كان ٢,٦%. هذا المعدل العالي للإصابة بالقرنية المخروطية في هذه المجموعة يعكس ارتفاع نسبه حدوث القرنية المخروطية في سكان بلدان الشرق الأوسط بالمقارنة مع البلدان الغربية.