

## Original Article

### Correlation between Corneal Thickness and Degree of Myopic Refractory Error

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#### ABSTRACT

**Background:** corneal thickness is an important factor in refractive surgeries such as Radial Keratotomy (RK), Photo Refractive Keratotomy (PRK) and Laser Insitu Keratomileusis (LASIK). This study evaluated the correlation between this factor and the degree of myopic refractory error.

**Methods:** In this cross-sectional study, 224 myopic eyes (112 patients) which had undergone LASIK operation were assessed. These patients had referred to Aban Eye Clinic, Isfahan, Iran, during August and September 2002. Corneal thickness was measured by ORB SCAN Topography, and cycloplegic refraction was performed with autorefractometry and retinoscopy. Suspected keratoconus cases and hyperopic patients were excluded.

**Results:** The patients' age was  $27.2 \pm 1.36$  in men (N = 35) and  $30.13 \pm 1.04$  in women (N = 77). Mean value of myopic refractory error in male patients was  $5.1 \pm 0.24D$  and in female patients was  $3.8 \pm 0.36D$ . Mean of corneal thickness was  $540 \pm 5.25 \mu M$  and  $530 \pm 5.88 \mu M$  in male and female patients respectively. There was no correlation between the degree of myopia and corneal thickness in any of the patients. Also in this research, no relations between the age and myopia were found. Right eye ( $P > 0.5$ ,  $r = 0.124$ ) Left eye ( $P > 0.5$ ,  $r = 0.104$ )

**Conclusion:** Based on our findings, corneal thickness and myopic refractory error do not seem to have any relations. ( $r = 0.039$ ,  $p = 0.684$ ).

**Keywords:** Corneal Thickness, Cornea, Myopia, LASIK, Refractory Error

Myopia is one of the most common refractory errors<sup>1</sup>. LASIK (Laser Insitu Keratomileusis) is one of the most popular and effective surgical techniques used especially for correcting myopia<sup>2,3,4</sup>. In this technique, excimer laser beam is used for correction of refractive error by ablating superficial layers of cornea. Hence there is no subsequent scar formation and opacification, and surrounding tissues of ablation zone remain intact<sup>1,5</sup>. Corneal thickness is an important factor in refractive surgeries such as RK, PRK and LASIK<sup>6</sup>. LASIK is a refractive surgery method in which we decrease the central corneal thickness by excimer laser<sup>7-8</sup>. The corneal thickness plays an important role in the efficacy of correction. Serious complications of refractive surgery are due to insufficient corneal thickness. Correction of high myopia usually

causes loss of corneal thickness which may induce corneal ectasia. Therefore, we tried to investigate the correlation between this factor with the degree of myopic refractory error<sup>9-10</sup>.

#### Materials and Methods

This was a cross-sectional study including 112 patients (224 eyes) who were admitted in Aban Eye Clinic, Isfahan, Iran, during August and September 2002. All the 224 myopic eyes (112 patients) underwent LASIK operation.

Corneal thickness was measured by ORB SCAN II (bausch & lomb) topography, and cycloplegic refraction was performed using autorefractometry (Nikon) and retinoscopy. ORB SCAN topography

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and autorefractometry both were done by the same technician. Suspected keratoconus cases and hyperopic patients were excluded. For each case, a data sheet including name, date, sex, age, degree of myopia and the corneal thickness of each eye was filled. The collected data were analyzed on a computer using SPSS.9.

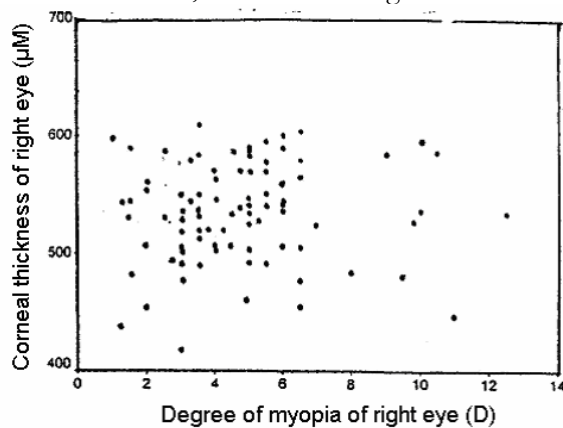
**Results**

Patients' mean age was  $27.2 \pm 1.36$  (N= 35) and  $30.13 \pm 1.04$  (N= 77) in male and female patients respectively. Mean value of myopic refractory error was  $5.1 \pm 0.24D$  and  $3.8 \pm 0.36D$  in male and female patients respectively. Mean corneal thickness was  $540 \pm 5.25 \mu M$  in male patients while it was  $530 \pm 5.88 \mu M$  in the females. Demographic properties of the cases are presented in table 1. There was no correlation between the degree of myopia and corneal thickness in any of the patients (table 2 and figures 1& 2). Also in this research no relation between the age and myopia was found [Right eye ( $p > 0.5$ ,  $r = 0.124$ ), Left eye ( $p > 0.5$ ,  $r = 0.104$ )].

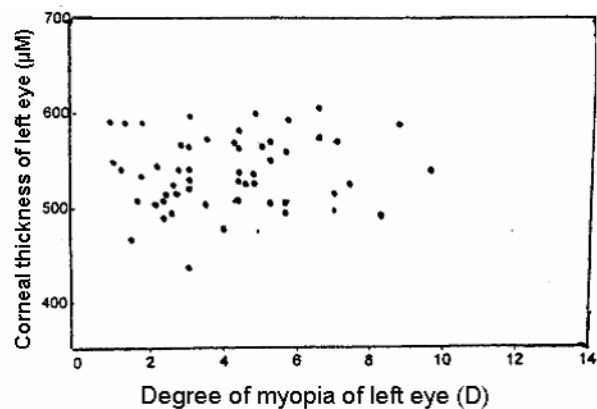
**Discussion**

Corneal thickness is an important factor in refractive surgeries. This factor is more important in myopic patients; because in such patients laser ablation is done in the center of cornea which is the thinnest zone. Iatrogenic keratectasia can develop after LASIK, if there is insufficient remaining stromal bed. Most surgeons leave 250-300  $\mu M$  of cornea untouched by Laser ablation or corneal flap dissection. In addition, corneal thinning disorders such as

keratoconus, suspected keratoconus or pellucid marginal degeneration are contraindications to LASIK. Although keratectasia is usually considered when LASIK is performed for higher myopic corrections, in thin corneas, or in patients who have had multiple Laser ablations, the condition has also been reported to occur in eyes with less than 4D of myopia. Gas-permeable contact lenses or penetrating keratoplasty may be required for treatment. Intracorneal ring segments (intacs) are being investigated as a possible treatment<sup>10</sup>. In this study, we did not find any correlation between the corneal thickness and the degree of myopia. In another similar study,(Chang - S-W et al, 2001) a relationship between corneal thickness and myopia was found ( $r = 0.16$ ,  $p = 0.21$ )<sup>11</sup>. Yet, in our study, no relations were found between the corneal thickness and myopic refractory error ( $r = 0.039$ ,  $p = 0.684$ ). In this research, the number of cases was doubled. This difference can be due to the difference in corneal thickness in the two societies. The mean thickness in that survey was less than in our study. Mean value of corneal thickness in this study was  $541.23 \mu M$  but corneal thickness in Chang's research was  $533 \mu M$  ( $p$  value < 0.05). This fact can suggest that myopia depends on multiple factors. According to the obtained results, we insist that corneal thickness measurement in the eyes even with low degrees of myopia in refractive surgeries should carefully be performed .



**Figure 1.** Correlation between myopia and corneal thickness (right eye)



**Figure 2.** Correlation between myopia and corneal thickness (left eye)

**Table 1.** Comparison of age, degree of myopia and corneal thickness between male and female subjects

		Sex	
		Female	Male
Age (year)		30.13 ± 1.04	27.20 ± 1.36
Degree of myopia (D)	Right eye	3.82 ± 0.37	5.09 ± 0.23
	Left eye	3.78 ± 0.36	5.16 ± 0.26
Corneal thickness (μM)	Right eye	532.37 ± 5.94	541.23 ± 4.85
	Left eye	527.06 ± 5.77	538.96 ± 5.56

**Table 2.** Correlation between corneal thickness and degree of myopia

	Sex			
	Female		Male	
	r	P	r	P
Right eye	0.108	0.35	0.277	0.19
Left eye	0.011	0.338	0.048	0.782

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