

# The Role Of Safe Margin Of Hypermetropia In Protection Against Post Lasik Regression In Myopic Patients

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## Abstract

**Purpose:**To determine post lasik aim of refraction in young myopic patient that ensure slight over correction (safe margin of hypermetropiaSMH) which help in reducing possibility of regressionand post lasik myopic shift, however this SMH should be easily overcomeby accommodation , doesn't affect UCVA or induce eyestrain.

**Patients and methods:**400 patients (800 eyes) were taken in this study, all of them had myopia and myopic astigmatism with -1.0 to – 6.0 D(spherical equivalent) during the period between 2008-2014 in Nassirya city, south of Iraq. Those patients were divided into 5 groups each group with 80 patients (160 eyes) and planned to have post lasik refraction of femmetrope, +0.5, +0.75, +1.0 and +1.25 D, for groups from no.1 to no.5 respectively and these groups followed up in term of UCVA, spherical equivalent, myopic shift, and asthenopia (eyestrain) for three years.

**Result:**Three yearsfollow up for the 5 groups showed that, in group no.1 (27.5%) of eyes had VA of 6/9 or worse, (33.125%) of eyes had myopic shift and(11.25%) of patients had eyestrain. In group no.2 (19.375%) of eyes had VA of 6/9 or worse ( 21.875%) of eyes had myopic shift and (8.75%) of patients had eyestrain. In group no.3 (11.25%)of eyes had VA of 6/9 or worse (9.375%) of eyes had myopic shift and (2.5%) of patients had eyestrain. In group no.4 ( 4.375%) of eyes had VA of 6/9 or worse, no myopic shift and (2.5%) of patients had eyestrain. In group no.5(12.5%) of eyes had VA of 6/9 or worse, no myopic shift and (15%) of patients had eye strain.

**Conclusion:** In young myopic patients with low to moderate myopia, we can choose post lasik aim of refraction of +1.0 D, this safe margin of hypermetropia SMH can ensure best UCVA without eyestrain (asthenopia), help in reducing regression and myopic shift.

**Key words:** safe margin of hypermetropia, regression, asthenopia, myopia, Lasik.

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## Introduction

as one of the bothering possible outcomes of lasik procedures for both doctor and patient and it is one of the most common reason for patient dissatisfaction.<sup>(4)</sup>Sometimes it is

Lasik now is common procedure all over the world to correct different types of refractive errors, and myopia is at the top of the list of these refractive errors.<sup>(1-3)</sup>For long years regression is considered

period between 2008-2014 in Nassirya city south of Iraq. Those 400 patients were divided into five groups, each group contains 80 patients (160 eyes). The age range in each group was 19- 30 year while their refraction vary between -1.0 to-6.0 D.(spherical equivalent) with VA of 6/12 or worse. All five groups were treated by lasik and followedup for three years in term of UCVA, spherical equivalent, myopic shift and asthenopia (eye strain).

In group no.1 the aim of post lasik refraction was to make patient emmetrope while the aim of post lasik refraction in group no.2 ,3,4, and 5 was to make patient hypermetrope by +0.5, +0.75, +1.0 and +1.25D respectively (using autorefractometer, retinoscopy, VA, and Deuchrom test to asses refraction).

In this study it is not intended to have 5 groups of patients with different aim of post lasik refraction but it is a matter of accumulative knowledge in which we started lasik treatment in 2008 aiming to post lasik emmetrope and with time we notice that it is mandatory to render patients slightly hypermetropic to reduce percentage of regression and shift of refraction to myopic side.

## Results

Five groups of myopic patients each group consists of 80 patients (160 eyes) with spherical equivalent range between -1.0 to -6.0 D were treated by lasik procedure and followed up for 3 years in term of UCVA, spherical equivalent ,myopic shift, and asthenopia, we noticed the following:

In group no. 1 in which post lasik refraction aim was emmetrope we found that UCVA after 3 years was 6/6 in 116 eyes (72.5%) while 44 eyes (27.5%) had UCVA of 6/9 or worse (fig.1). The spherical equivalent was +0.25 to +0.5 D in 107 eyes (66.875%) while it was -0.25- 1.0 D in 53 eyes (33.125%) (fig.2). Regarding myopic shift we found that 53 eyes (33.125%) had myopic shift -0.25 to - 1.0 D while 107 eyes (66.825%) was on hypermetropic side +0.25 D (fig.3). In term of asthenopia 9 patients (11.25%) had asthenopia while 71 patients (88.75%) had no complain (fig.4).

embarrassing for doctor and his professional reputation(especially in developing countries) to tell patient that he has to repeat lasik procedure or what we call enhancement procedure which could be costly for the patients. From patient point of view , patient may distrust his doctor and loose his compliance and this may end with dissatisfaction of patient regardless the results of visual acuity after enhancement procedure.<sup>(4,5)</sup> For that reason this study aimed to find out a best post lasik refraction goal that give a safe margin of low hypermetropia(SMH) which can be easily overcome by comfortable accommodation without eyestrain giving best UCVA .<sup>(6)</sup> This safe margin of hypermetropia (SMH) can avoid the deterioration of best UCVA by effect of regression,<sup>(7)</sup> so that reducing the need to enhancement procedure, saving money and effort as well as keeping a good patient doctor relationship, trust and satisfaction.<sup>(8)</sup>

## **Patients and methods**

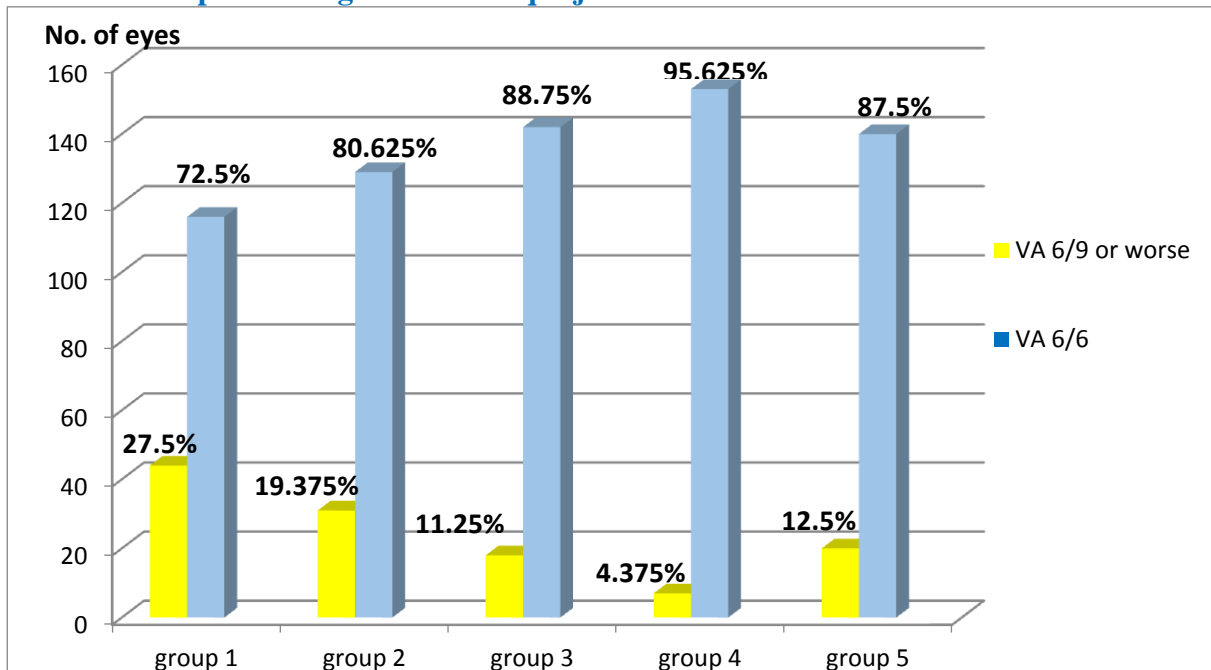
In this study 400 patients (800 eyes) were taken, including 283 female and 127 male all of them had lasik for correction of myopia or myopic astigmatism during the

In group no. 2 in which post lasik refraction aim was +0.5 D we found that after three years UCVA was 6/6 in 129 eyes (80.625%) while 31 eyes (19.375%) had UCVA of 6/9 or worse (fig.1). The spherical equivalent was +0.25 to +0.5 D in 125 eyes (78.125%) while it was -0.25 to -0.75 D in 35 eyes (21.875%) (fig.2). In term of myopic shift we found that 35 eyes (21.875%) had shifted to myopic side -0.25 to -0.75 D while 125 eyes (78.125%) was on hypermetropic side +0.25 to +0.5 D (fig.4). Regarding asthenopia we found that 7 patients (8.75%) had asthenopia while 73 patients (91.25%) had no eyestrain symptoms (fig.5).

In group no. 3 in which post lasik refraction aim was +0.75 D we noticed that UCVA after three years was 6/6 in 142 eyes (88.75%) while 18 eyes (11.25%) had UCVA of 6/9 or worse (fig.1). The spherical equivalent was +0.25 to +0.75 D in 145 eyes (90.625%) while it was -0.25 to -0.5 D in 15 eyes (9.375%) (fig.2). Regarding myopic shift we found that 15 eyes (9.375%) were shifted to myopic side -0.25 to -0.5 D while 145 eyes (90.625%) was on hypermetropic side +0.25 to +0.75 D (fig.3). In term of asthenopia we found that 2 patients (2.5%) had asthenopia while 78 patients (97.5%) had no complain (fig.4).

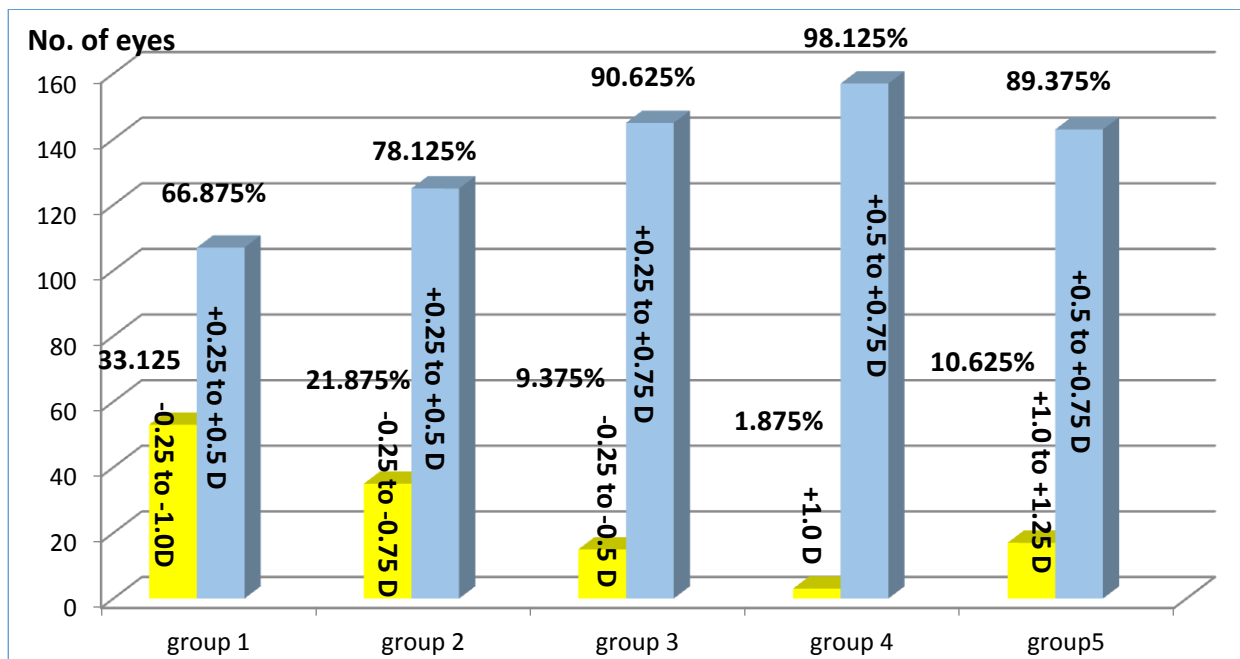
In group no. 4 in which post lasik refraction aim was +1.0 D we found that UCVA after three years was 6/6 in 153 eyes (95.625%) while 7 eyes (4.375%) had UCVA of 6/9 or worse (fig.1). The spherical equivalent was +0.5 to +0.75 D in 157 eyes (98.125%) while it was +1.0 D in 3 eyes (1.875%) (fig.2). There was no myopic shift and all the group was on hypermetropic side (fig.3). Regarding asthenopia 2 patients (2.5%) had asthenopia while 78 patients (97.5%) had no complain (fig.4).

In group no. 5 in which post lasik refraction aim was +1.25 D we found that UCVA after 3 years was 6/6 in 140 eyes (87.5%) while 20 eyes (12.5%) had UCVA of 6/9 or worse (fig.1). The spherical equivalent was +0.5 to +0.75 D in 143 eyes (89.375%) while it was +1.0 to +1.25 D in 17 eyes (10.625%) (fig.2). There was no myopic shift and all the group was on hypermetropic side (fig.3). Regarding asthenopia, 12 patients (15%) had asthenopia while 68 patients (85%) had no complain (fig.4).



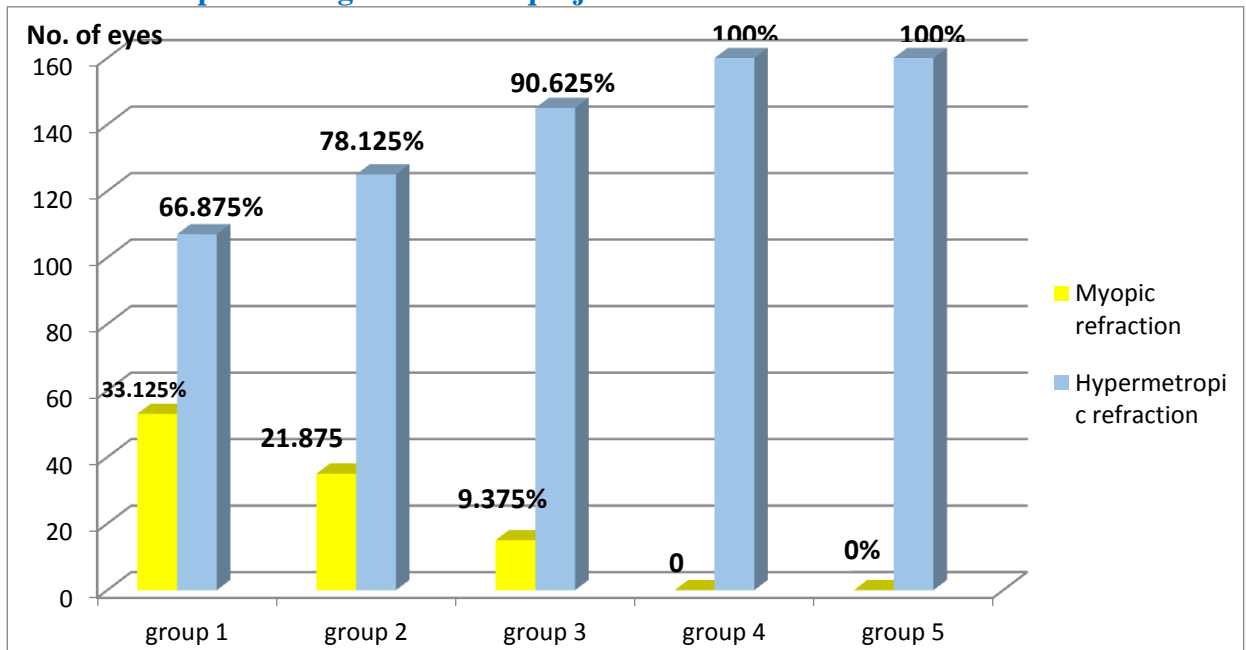
$X^2 = 25.26$        $df = 4$        $P\text{-value} = 0.00$

Figure (1): The relation between visual acuity and no. of eyes in studied groups.



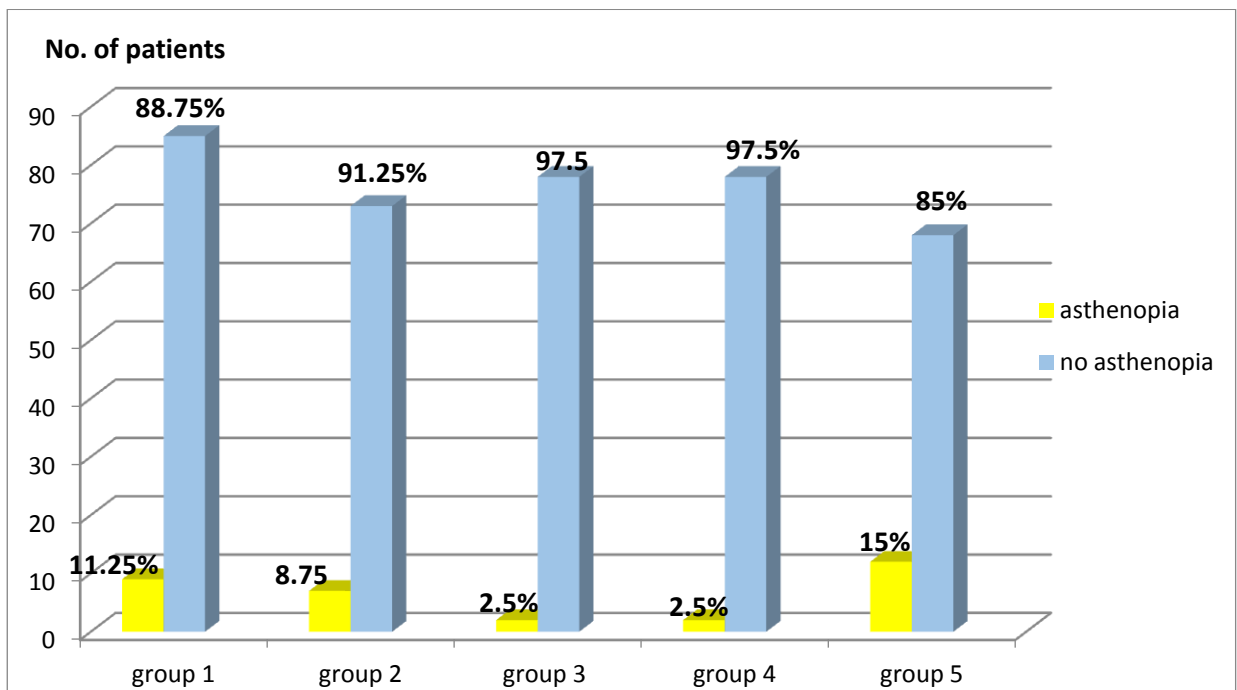
$X^2 = 45.53$        $df = 4$        $P\text{-value} = 0.00$

Figure (2): The relation between spherical equivalent and no. of eyes in studied groups.



$X^2 = 74.79$        $df = 4$        $P\text{-value} = 0.00$

Figure (3): Myopic shift in relation to no. of eyes in studied groups.



$X^2 = 14.66$        $df = 4$        $P\text{-value} = 0.005$

Figure (4): Asthenopia in relation to no. of patients in studied groups.

## Discussion

0.5 D. In group no.4 and 5 we noticed that most of eyes had spherical equivalent +0.5 to +0.75 D which was (98.175%) in group no.4 and (89.375%) in group no.5, while only 3eyes (1.875%) had spherical equivalent +1.0 D in group no.4 in comparison with 17 eyes (10.625%) had spherical equivalent of +1.0 to +1.25 D in group no.5. The difference was significant (p-value=0.00) (fig.2). The regression in group no.1,2, and 3 can be explained as a direct result of the narrow margin of hypermetropia of post lasik aim of refraction which was emmetrope +0.5 D and +0.75D respectively, while absence of regression in group no.4 and 5 is a direct result of a wide margin of hypermetropia of post lasik aim of refraction which was +1.0 D and +1.25 D respectively. If we compare group no.4 and 5 we notice that the margin of post lasik aim of refraction was more safe in group no. 4 and only (1.875%) had +1.0 D post lasik refraction while (98.125%) of eyes have +0.5 to +0.75 D post lasik refraction which is stable refraction,<sup>(11)</sup> easily overcome by accommodation and I prefer to call this margin of hypermetropia (safe margin of hypermetropia SMH). Looking at group no.5, (10.625%) of eyes had +1.0 to +1.25 D post lasik refraction which is wide margin of hypermetropia not easily overcome by accommodation hence it is not safe margin of hypermetropia.

When we compare the five groups that differ in the aim of post lasik refraction which is emmetrope for group no.1 and +0.5, +0.75, +1.0, +1.25 D for group no. 2,3,4, and 5 respectively. If we compare the 5 groups in term of UCVA after three years we noticed that, in group no.1(72.5%) of eyes had 6/6 UCVA increasing to (80.625%) in group no.2 and to (88.75%) in group no.3 reaching maximum (95.625%) in group no.4, while decline seen to (87.5%) in group no.5. The difference was significant (p-value=0.00) (fig.1). This can be explained by the regression<sup>(9,10)</sup> that happened in eyes in groups no. 1,2,3 and the regression was more in group no.1 followed by no. 2 and 3 while UCVA was best in group no.4 because regression does not happened and eyes can accommodate easily with small degree of hypermetropia. In group no.5 the rate of UCVA 6/6 declines to (87.5%) due to overcorrection (where the aim of post lasik refraction was +1.25 D) to which eyes cannot accommodate in about (12.5%) of cases.

Comparing the 5 groups in term of spherical equivalent we found that maximum myopic regression was seen in group no.1 both in number of eyes (53 eyes) and amount of spherical equivalent -0.25 to -1.0 D decreasing in group no.2 to 35 eyes (21.875%) with spherical equivalent -0.25 to -0.75 D and decreased more in group no.3 to 15 eyes (9.375%) with spherical equivalent -0.25 to -

asthenopia is maximum in group no.5 (15% of patients) and this can be explained by the overcorrection that happened in post lasik refraction since (10.625%) had spherical equivalent of +1.0 to +1.25 D. Group no.1 is the second group in the rank (11.25%) followed by group no.2 (8.75% ) while group no.3 and 4 had the minimum no. of patients(2.5%) that had complain of asthenopia and this can be due to the reasonable post lasik refraction of group no.3 and 4. The difference was significant (p-value=0.005) (fig.4).

### Conclusion

of choosing safe margin of hypermetropia (SMH) can help dramatically to eliminate the need to enhancement procedure <sup>(12-14)</sup> and help to reach a good level of patient trust and satisfaction.

It is important to notify that I couldn't find a similar study to compare and evaluate the results therefor I recommend to do more studies that determine and evaluate a best post lasik aim of refraction which was +1.0 D. according to this study.

When we look at myopic shift figure in 5 groups which reflect no. of eyes that had refraction on myopic side we found that myopic shift is maximum in group no.1 (33.125%) decreased to (21.875%) in group no.2 and to (9.375%) in group no.3 while it became (0% ) in group no.4 and 5. The difference was significant (p-value=0.00) (fig.3). Absence of regression again in group no. 4 and 5 is due to margin of hypermetropia intended in post lasik refraction which is safe in group no. 4 (SMH) and large (not safe) in group no.5.

If we compare the 5 groups in term of asthenopia we will find that

In a young myopic patient with low to moderate myopia, regression can be avoided to a good extent and safely by using a post lasik aim of refraction of +1.0 D. From this study it is obvious that this safe margin of hypermetropia (SMH) considered safe because it is easily overcome by accommodation so that doesn't impair UCVA, not cause significant eyestrain (asthenopia), play a good role in decreasing regression and preventing shift of refraction to myopic side. This simple maneuver

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## إضافة درجة بؤرية موجبة واحدة في تصحيح البصر للحد من تراجع انكسار العين باتجاه القصر بعد عملية تصحيح البصر

د. علي جواد الكدس

### الخلاصة

أجريت هذه الدراسة لغرض إستكشاف طريقة آمنة للحد من ظاهرة تراجع إنكسار العين باتجاه قصر البصر للمرضى الذين أجريت لهم عملية تصحيح البصر. وقد تم اخذ عينة من ٨٠٠ عين في مدينة الناصرية، تم تقسيمهم الى خمس مجاميع كل مجموعة تحتوي ١٦٠ عين تم تصحيح البصر لكل مجموعة وفق بعد بؤري موجب معين. وقمنا بمراقبة الحالات على مدى ثلاث سنوات لمتابعة حدة البصر وإنكسار العين والميل الى القصر والشد حول العين. وقد لاحظنا ان المجموعة التي تم اختيار بعد بؤري درجة واحدة موجبة لتكون الهدف لانكسار العين بعد تصحيح البصر هي المجموعة الأكثر استقرارا من حيث حدة البصر والابعد عن التراجع باتجاه قصر البصر.