

Original Article

Prevalence of Pre-Existing Corneal Astigmatism in Age Related Cataract Patient

MA Rashid¹, KA Hossain², AKMR Islam³

Abstract :

Cataract surgery is no more a blind rehabilitation surgery, it absolutely gives normal vision. In the era of modern cataract surgery patients expectations are also high about visual outcome. This prospective study was carried out to investigate the magnitude and pattern of pre-existing corneal astigmatism in age related cataract patient at Faridpur Medical College Hospital, Faridpur and Agha Yusuf Adhunik Hospital, Kustia, from July 2009 to June 2012. We examined 850 eyes of 730 patients who underwent cataract surgery. The mean age at the time of surgery was 61.9 ± 8.1 (40 to 70) years. Corneal astigmatism was measured by Auto Refractometer at least two times for each patient. Astigmatism was calculated from dioptric difference of vertical reading from horizontal reading. With the rule (WTR) astigmatism was considered when steep meridian at $90^\circ \pm 20^\circ$. Against the rule (ATR) astigmatism was considered when steep meridian at $180^\circ \pm 20^\circ$. Astigmatism in other direction is defined as oblique. On keratometry, when vertical reading (k1) was found greater than horizontal (k2) was considered WTR astigmatism and the reverse reading for ATR astigmatism. The percentage of corneal astigmatism was 1D or less was 69.6%, more than 1D and less than 1.5D, 27.6% and more than 1.5D and less than 2D 2.8%. Prevalence of ATR astigmatism was more than WTR astigmatism and prevalence of ATR astigmatism increases significantly with age. Approximately two third of pre-operative patient had 1D or less astigmatism and one third had more than 1D corneal astigmatism.

Key words: Cataract, Astigmatism.

Introduction :

Cataract is the main cause of reversible blindness in the world accounting for about three quarters of blindness. Significant efforts are being undertaken to increase the output of vision through safe cataract services. Cataract surgery has undergone great refinement in recent years. Goal of cataract surgery is to achieve a desirable refractive outcome with minimal induction of astigmatism after surgery¹. Some of the factors affecting the Surgically Induced Astigmatism (SIA) are the architecture and site of incision, surgical skill, and to a great extent of pre-existing corneal astigmatism².

1. Dr. Md. Abdur Rashid, MBBS, MCPS (Ophthalmology), DO, FCPS (Ophthalmology), Associate Professor & Head, Department of Ophthalmology, Tairunnesa Memorial Medical College and Hospital, Boardbazar, Gazipur, Bangladesh.
2. Dr. Kh. Anowar Hossain, MBBS, DO, Associate professor, Department of Ophthalmology, Faridpur Diabetic Association Medical College & Hospital, Faridpur.
3. Dr. A K M Rafiqul Islam, MBBS, DO, Medical Officer, Faridpur General Hospital, Faridpur.

Address of correspondence :

Dr. Md. Abdur Rashid MBBS, MCPS (Ophthalmology), DO, FCPS (Ophthalmology), Associate professor & Head, Department of Ophthalmology, Tairunnesa Memorial Medical College and Hospital, Boardbazar, Gazipur, Bangladesh. Mobile: +88-019-25866238. E-mail:marashid0707@yahoo.com

It has been documented that approximately 15% of cataract patients have more than 1.5 diopter of pre-existing keratometric astigmatism³. In cataract surgery, the corneal incision has a small flattening effect on the corneal curvature which can be used to reduce pre-existing corneal astigmatism⁴. Post-operative astigmatism is one of the major causes of visual dissatisfaction of the patient. Recent progress in cataract surgical technique has heightened patient's expectation of visual outcome; good post-operative vision without spectacles is considered normal. Astigmatic error of 1 to 2 diopter may reduce uncorrected visual acuity to the 20/30 or 20/50 level whereas astigmatism of 2 to 3 diopter may correspond to visual acuity between 20/70 and 20/100⁵. Thus control of post-operative astigmatism is a key factor in meeting these expectations.

So it is important to analyze the magnitude and pattern of pre-existing corneal astigmatism to control post-operative astigmatism that is responsible for visual dissatisfaction of patients in cataract surgery.

Materials and methods :

The study was carried out at Faridpur Medical College & Hospital (FMCH), Faridpur and Agha Yusuf Adhunik Hospital (AYAH), Kustia, Bangladesh from July 2009 to June 2010. We examined 850 eyes of 730 patients who underwent cataract surgery. The mean patient age at the time of surgery was 61.9 ± 8.1 years ranged from 40 to 70 years. We excluded the patients have corneal disease, irregular astigmatism, presence of pterygium and previous intraocular surgery from our study. We measured the corneal astigmatism by using Auto Refractometer. We carried out the measurement at least two times for each patient. Astigmatism was calculated from dioptric difference of vertical reading from horizontal reading. With the rule (WTR) astigmatism was considered when steep meridian at $90^\circ \pm 20^\circ$. Against the rule (ATR) astigmatism was considered when steep meridian at $180^\circ \pm 20^\circ$. Astigmatism in other direction is define as oblique. On keratometry, when vertical reading (k1) was found greater than horizontal (k2) was considered WTR astigmatism and the reverse reading for ATR astigmatism.

Results :

The mean patient age at the time of surgery was 61.9 ± 8.1 years ranged from 40 to 70 years (Table-I)

Table-I: Distribution of patients according to age.

Age in years	No. of patients	Percentage (%)
40 - 50	131	18
51 - 60	211	29
60 - 70	388	53

The percentage of pre-existing corneal astigmatism was 1D or less was 69.6%, more than 1D and less then 1.5D, 27.6% and more than 1.5D and less then 2D 2.8% (Table-II). The prevalence of preexisting ATR astigmatism was more than WTR astigmatism (Figure 1)

Table-II: Magnitude of pre-existing corneal astigmatism among the study group.

Pre-existing corneal astigmatism (Dioptre)	No. of patients	Percentage	Mean Value \pm SD
< 1	408	69.6	
1 - 1.5	302	27.6	1.17 \pm 0.89
1.5 - 2	20	2.8	

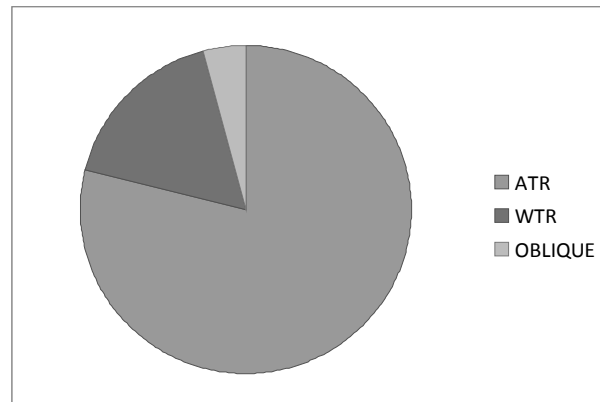


Figure 1: Pattern of pre-existing corneal astigmatism among the study group.

Discussion :

The success of cataract surgery either small incision cataract surgery or phacoemulsification is determined by quicker visual and functional recovery. Control of post-operative surgically induced astigmatism (SIA) is a key factor in meeting the expected visual outcome. The current study showed that the percentage of pre-existing corneal astigmatism was 1D or less was in 408 cases (69.6%), more than 1D and less then 1.5D in 302 cases (27.6%) and more then 1.5D and less then 2D in 20 cases (2.8%). The mean astigmatism is 1.17 ± 0.75 dioptre. The pattern of astigmatism was ATR astigmatism 79 %, WTR astigmatism 17% and Oblique 4%. The prevalence of ATR astigmatism more than WTR astigmatism. The ATR astigmatism increases significantly with the age.

Miyake et al⁶. observed that the mean corneal astigmatism was 1.02 ± 0.81 D. The percentage of 1D or less of corneal astigmatism was 63.6%, that of more than 1D and 1.5D or less was 20.9%, that of more than 1.5D and 2D or less was 7.4%, that of more than 2D and 2.5D or less was 3.8% and that of more than 2.5D and 3 D or less was 1.8%.

Khan MI et al⁷. showed corneal astigmatism was 0.50 or less in 301 eyes (24.47%), 1.5D or less in 978 eyes (79.50%), and 3.00D or more in 24 eyes (1.93%). Ferrer-Blasco T et al⁸. observed that corneal astigmatism less than 1dioptre was present in most cataract surgery patient; it was higher in about 22%, slight differences between the various age ranges. They also observed in 13.2% eyes, no corneal astigmatism was present, in 64.4% corneal astigmatism was between 0.25 and 1.25D and end 22.2% it was 1.5D or higher.

Leffler et al⁹. found 1.00 diopter pre- existing corneal astigmatism in their series of 161 patients. Shen et al¹⁰. demonstrated average pre operative corneal astigmatism 2.77+ 0.74 diopter. These results are comparable with our study.

Conclusion:

Approximately two third of pre-operative patient had 1D or less astigmatism and remaining one third had more than 1D corneal astigmatism. The Frequency of ATR astigmatism is greater than WTR astigmatism. The prevalence of ATR astigmatism increases significantly with the age. So it is important to analyze magnitude and pattern of pre-existing corneal astigmatism in age related cataract patients waiting for cataract surgery to control astigmatism and ensure good post-operative visual outcome.

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