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Al-Shifa Journal of Ophthalmology

Editorial inquiries should be addressed to Prof. Dr. Tayyab Afghani, Department of Orbit and Oculoplastics, Al-Shifa Trust Eye Hospital, Jhelum Road Rawalpindi, Pakistan.
Tel: 0092 51 5487821-25, Fax: 0092 51 5487827: Email:aqrcpio@yahoo.com ;
Website: www.asjoalshifaeye.org

EDITORIAL

Ethical Considerations in Ophthalmic Research and Practice

Mahmood Ali

In the rapidly evolving field of Ophthalmology, ethical considerations are paramount to ensure the highest standards of patient care and research integrity. With advancements in medical technology and treatment methodologies, navigating the complex ethical landscape effectively becomes increasingly essential. Ethical issues such as informed consent, protection of vulnerable populations, risk-benefit analysis, data privacy, and conflict of interest management are critical in clinical practice.

Informed consent remains fundamental to ethical medical practice, ensuring that patients fully understand the nature, risks, and benefits of the research they participate in.[1] Clear communication, often involving layman's terms and visual aids, is necessary to help patients make informed decisions. For example, a recent study emphasized using child-friendly explanations to improve understanding and cooperation among pediatric patients, demonstrating the need for tailored communication strategies. Protecting vulnerable populations, such as children, the elderly, and those with cognitive impairments, is also essential. Additional safeguards, including obtaining consent from legal guardians and ensuring direct benefits to these groups, are crucial.[2,3] Simplifying the consent process in pediatric research has proven effective in enhancing understanding and cooperation, underscoring the importance of targeted efforts to protect these groups.

Balancing the risk-benefit ratio in research is another critical consideration. Rigorous assessments and independent ethics committee reviews are necessary to justify potential benefits against inherent risks.[4] For instance, a trial for a new medication may include frequent monitoring and robust patient support to ensure that the potential for improved outcomes is carefully balanced against the risk of side effects.

In the digital age, data privacy and confidentiality are increasingly complex issues. Robust data protection measures, including anonymization and secure storage, are vital to maintaining patient trust. The implementation of advanced encryption technologies in a large-scale study ensured the security of patient data, thereby fostering greater participation and trust.[1]

Transparent disclosure and management of conflicts of interest, whether financial or personal, are essential to prevent bias in research outcomes. Equitable access to clinical trials is also crucial, requiring efforts to recruit a diverse patient population and address barriers such as transportation or financial constraints.[2] Moreover, respecting patient autonomy and maintaining professional boundaries are fundamental ethical principles in research and practice.[4] Physicians must provide comprehensive information and support shared decision-making, respecting patients' choices.

Resource allocation, cultural sensitivity, and ongoing education for healthcare providers underscore the need for ethical vigilance. In resource-limited settings, transparent and fair systems for allocating resources, prioritizing patients based on medical urgency rather than socioeconomic status, are essential. Regular audits, patient advocacy, and transparent reporting help ensure compliance with ethical standards.

Addressing these ethical challenges in Ophthalmology is crucial for advancing the field while safeguarding patient rights and promoting trust in medical research and

practice. Institutional Review Boards (IRBs) play a vital role in overseeing research ethics, ensuring studies meet rigorous ethical standards.[4] Continuous training for researchers and clinicians in ethics, informed consent processes, and data protection is indispensable. By upholding these ethical considerations, the field of Ophthalmology can continue to progress, fostering innovation and improving patient care.

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ORIGINAL ARTICLE

Mean Errors From The Target Refraction at 1 Month After Phacoemulsification Surgery in High Myopes: A Comparison Of SRK/T, Haigis And Holladay 1

Shafaq Najmi[1], Badaruddin Athar Naeem[2], Tehmina Nazir[2], Fariha Taimur[1], Zawar Ali Rathore[1]

Abstract:

Objectives: To assess differences in mean numerical errors in high myopes from the predicted target refraction using SRK/T, Haigis, and Holladay 1 IOL formulas

Methods: High myopes having ≤ - 6 D SER and/ or ≥ 26mm axial lengths undergoing uncomplicated phacoemulsification surgery for cataracts and completing 1-month follow-up were included. SRK/T was used for the implanted IOL and the target refraction was predicted using the 3 formulas mentioned above. At 1-month, spherical equivalent refraction was calculated and the difference from the predicted refraction was reported as a mean numerical error (MNE). The Kruskal-Wallis test was used to find differences between the data as it was not normally distributed. Mann-Whitney U test was used to find differences between genders and 2 age groups of 50-59 and 60-70 years.

Results: There were 57 females (45.6%) and 68 males (54.4%) included in the study with a mean age of 57.36 ± 6.17 years. There were no significant differences between the mean numeric error using the Kruskal-Wallis test, (p = 0.161). The Mann-Whitney U test did not find differences between the genders or the age groups using the 3 formulas.

Conclusions: Keeping in view, the limitations of the study, the 3 formulas in our sample performed similarly in high myopes for post-operative refractive outcomes. More studies with randomized designs and optical biometry are needed to elucidate differences in mean numeric error more accurately between the formulae. *Al-Shifa Journal of Ophthalmology 2024; 20(3): 88-92.*

1. *Al-Shifa Trust Eye Hospital Rawalpindi.*
2. *Ophthalmology Department, Fauji Foundation Hospital Rawalpindi.*

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Correspondence to:
Shafaq Najmi
Al-Shifa Trust Eye Hospital Rawalpindi.
shafaq_05@hotmail.com

Introduction:

According to the ICD-11 classification, myopia is listed as a disorder of refraction, in which light rays parallel to the optic axis are brought to focus in front of the retina, because of a large axial length, overly curved cornea or a lens with increased optical power. A World Health Organization (WHO) report in 2015 defined myopia as SER ≤-0.5D, and high myopia as SER ≤-5 D, and acknowledged the absence of standard definitions in the literature. The International Myopia Institute task force in 2019 [1], defined high myopia as ≤ - 6 D and proposed that the former WHO definition may be relevant to the prevalence and population studies, whereas the latter may be more relevant

clinically as the risk of uncorrected vision loss increases significantly beyond this value. Furthermore, clinically ≥ 26mm axial length is considered as high myopia.

Myopia and high myopia, significantly increase the risk of ocular complications, including a higher risk of cataracts, glaucoma, retinal detachment, and macular degeneration to name a few. This is especially more common in high myopia [2], where the pathogenesis may be different than in low-moderate myopia. Moreover, the prevalence of myopia is increasing worldwide, which is projected to increase to 49.8% of the global population by 2050[3]. As the rates increase, the associated complications will become more prevalent, especially considering that cataracts are already one of the leading causes of blindness worldwide [4].

The primary goal of uncomplicated cataract surgery is to provide the best optical correction and good visual outcomes to the patients. Failure to achieve these outcomes may lead to medicolegal issues [5], apart from the poor satisfaction of patients and surgeons. To ensure accurate power calculations, various sources of error need to be eliminated. These include variations in axial length measurement, keratometry, post-operative anterior chamber depth prediction, and IOL position [6]. For axial length measurement, optical biometry may be superior to ultrasound measures, especially in cases of posterior staphyloma found more commonly in high myopes, but cannot be used in cases of dense cataract, corneal edema, or vitreous hemorrhage.

The NHS benchmark for post-op refractive outcomes dictates that 85% of eyes should be within 1 D, and 55% within 0.5D of the intended spherical equivalent refraction [7]. To this end, various IOL formulae have been devised. Current NICE guidelines advise the use of Haigis or Hoffer Q for axial lengths < 22 mm, between 22- and 26-mm Barret universal II formula should be considered if it is installed in the machine and does not need to be calculated manually, otherwise SRK/T is recommended. For axial lengths >26mm, Haigis or SRK/T should be used [8]. However, data regarding high axial lengths are inconclusive, and Barret universal formula has been shown to be superior according to some studies [9].

The goal of the present study is to evaluate the postoperative mean refractive (numeric) errors from the intended outcomes in high myopes with cataracts, using Haigis, Holladay 1, and SRK/T IOL formulas for power calculations, to better match formula selection in a Pakistani patient population.

Materials and Methods:

This observational, cross-sectional study was conducted at the Department of Ophthalmology, Fauji Foundation Hospital, Rawalpindi, Pakistan, between 5th April 2018 and 5th October 2018, after approval from the ethical review committee of the institute. High myopes were defined as having spherical equivalent refraction (SER) of ≤-6D and/or axial lengths ≥26mm. Those undergoing routine cataract surgery and completing the 1-month follow-up were included. Cases having a complicated, eventful surgery, or not having in-the-bag IOL implantation, a history of previous ocular surgeries, or those requiring combined procedures were excluded from the study.

After obtaining informed consent, patients were included in the study after full preoperative refraction and anterior and posterior segment examination where applicable. Data were collected including age, axial length, and k-readings, along with IOL-power predicted using 3 different formulas, namely, Haigis, Holladay 1, and SRK/T. The corneal power was measured with the Canon RK-F1 Auto-refractor-keratometer. A scan was done after k readings, via a Quantel Medical Axis-II biometry device. Biometry was performed by a single user, using the same technique each time. Multiple measured readings of axial lengths and chamber depth were used, and the standard deviation was kept below 0.1 to keep the accuracy of measurements

as high as possible. All surgeries were done by a single surgeon and the IOL implanted was from the same manufacturer. Only SRK/T was used for the actual implanted IOL. At 1-month post-op, the SER from the intended outcome was measured and compared with the predicted IOL power from the formulas. The mean numeric error (MNE) was calculated for each formula as the difference between predicted post-operative refraction and the actual refraction at 1 month.

After data cleaning and entry, descriptive analysis was done using SPSS version 26. Quantitative data were reported as mean ± SD and categorical data were reported as frequencies and percentages where applicable. To differentiate between the MNE, the Kruskal-Wallis test was used after checking the normality of data, and a p-value of < 0.05 was taken as significant. For comparing MNE between males and females and age groups, the Man-Whitney U-test was used.

Results:

There were 57 females (45.6%) and 68 males (54.4%) included in the study with a mean age of 57.36 ± 6.17 years (Range 50 – 78). The mean axial lengths were 25.68 ± 0.78 mm.

The Mean numeric error (MNE) for SRK/T was 0.127 ± 0.33 D, for Haigis, it was 0.214 ± 0.18 and for Holladay 1, it was 0.215 ± 0.189. The Kruskal-Wallis test was used to assess differences between the post-operative mean numeric errors of the 3 formulas. However, the p-value was not significant (p=0.161).

Similarly, between genders, there were no significant differences in the MNE among the formulas used (Table 1), nor for age groups between 50-59 and 60-70 (Table 2).

Table 1: Mann-Whitney U test for comparing MNE using different formulas between genders

Formula	Gender	n	Mean Rank	p-value
SRK/T	male	68	59.43	0.226
	female	57	67.25	
Haigis	male	68	67.76	0.104
	female	57	57.32	
Holladay I	male	68	63.88	0.765
	female	57	61.95	

Table 2: Mann-Whitney U test for comparing MNE using different formulas between age groups

Formula	Age group	n	Mean Rank	p-value
SRK/T	50-59	80	63.81	0.440
	60-70	43	58.64	
Haigis	50-59	80	61.20	0.731
	60-70	43	63.49	
Holladay I	50-59	80	59.03	0.204
	60-70	43	67.53	

Discussion:

The present study was carried out to assess differences between the post-operative mean numeric errors from the intended refractive outcome, using the 3 IOL-formulas, namely, SRK/T, Haigis, and Holladay 1 for high myopes undergoing uncomplicated cataract surgery. The

Kruskal-Wallis test was used as the data were not normally distributed, and the result was not statistically significant (p=0.161).

There is some variation in the literature as to the best formula for use in myopic eyes. A study in Germany reported relatively poor outcomes with SRK II but recommended the use of Haigis and SRK/T [10]. Thus, there were no significant differences between the 2 formulas, which is in line with our study. Of note, however, is that optimizing the constants for positive and negative IOLs, improved outcomes for all the formulas included in the study. However, axial myopia was not defined, biometry was done using optical methods, and those having glaucoma, amblyopia, and myopic degeneration were not excluded.

Another study showed that Haigis has better outcomes compared to SRK/T, but high myopia was defined as having ≥ 24mm axial length, and the target refraction was -1.0 D. There were 25 individuals in both groups however [11]. The present study has a higher sample for the analysis.

A few studies report better outcomes with SRK/T in very highly myopic eyes [12], while others report better outcomes with Haigis and Barrett Universal II formula [13]. However, the former study included only negative power IOLs with an average axial length of 32.65mm, while the latter study included cases with more than 28 mm axial length. Comparing outcomes with such variations should be done with caution, as our study included cases with a mean of 25.68 ± 0.78 mm axial length.

Finally, some evidence points to the similarity of these formulas in high myopes. Apart from the evidence presented above [10], a study reported no difference in mean errors after using Holladay I, Haigis, and SRK/T in myopes with ≥24.5 mm axial length [14]. This seems to be in line with our study.

The results of this study should be interpreted with some limitations in mind. The corneal incisions were not taken into account using K readings to neutralize astigmatism while performing the surgery. This should impact the mean errors post-operatively. Furthermore, grouping patients into different categories of formulas and then implanting IOLs will yield more accurate results, unlike the present work where only IOLs calculated with SRK/T were implanted, and the powers predicted for the rest of the formulas. Furthermore, high myopes may have thinner corneas, and optical biometry may have better accuracy as the deformation induced via contact with A scan machine may lead to erroneous measurements.

Conclusion:

Keeping in view the limitations of the study, more research is needed to elucidate the ideal formula in high myopes, however, in our research, the 3 formulas performed similarly.

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Authors Contribution
Concept and Design: Badaruddin Athar Naeem
Data Collection / Assembly: Tehmina Nazir
Drafting: Fariha Taimur
Statistical expertise: Zawar Ali Rathore
Critical Revision: Shafaq Najmi

ORIGINAL ARTICLE

Comparison of Anterior Lamellar Recession With and Without Blepharoplasty For Upper Eyelid Cicatricial Entropion

Asima Rafique[1], Muhammad Shaheer[2]

Abstract:

Objectives: To compare the success rate and cosmetic outcomes of anterior lamellar recession versus anterior lamellar recession plus blepharoplasty for treatment of cicatricial entropion of the upper eyelid.

Methods: This Quasi-Experimental study, after approval of the ethics committee of the institute, was carried out between 1st February 2022 to 30th June 2023 at the Institute of Ophthalmology, Mayo Hospital, Lahore. Eighteen patients presenting to the Institute of Ophthalmology and diagnosed with cicatricial entropion were selected for surgery. The subjects were divided into two groups 1 and 2. Group 1 patients underwent anterior lamellar recession alone while group 2 had anterior lamellar recession combined with blepharoplasty. Patients diagnosed with any coexisting senile entropion or ectropion were excluded from the study.

Results: Group 2, which underwent anterior lamellar recession with blepharoplasty, exhibited higher rates of complete success (77.8%) compared to Group 1 (44.4%), (p=0.43). Aesthetic outcomes favored Group 2, with 66.7% of patients in this group rated as having a good aesthetic outcome, compared to only 22.2% in Group 1. When evaluating post-operative success by grade, in Group 1, those with Grade 1 entropion exhibited a success rate of 60%, however, in Group 2, all Grade 1 cases achieved complete success.

Conclusion:

There is no significant difference between anterior lamellar recession with blepharoplasty and without blepharoplasty for upper eyelid cicatricial entropion. *Al-Shifa Journal of Ophthalmology 2024; 20(3): 93-100.*

1. *Sir Gangaram Hospital, Lahore.*
2. *College of Ophthalmology & Allied Vision Sciences, Lahore.*

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Correspondence to:
Muhammad Shaheer
College of Ophthalmology & Allied Vision Sciences, Lahore.

Introduction:

Entropion is a pathology of eyelids in which the lids are turned inwards so that the pilosebaceous unit is touching the globe (cornea).[1] It can involve upper and lower eyelids separately or both eyelids simultaneously. Various variants of entropion have been described in literature with each having its distinct pathophysiology and incidence as high as 2% in some communities. Some common types include involutional or senile, congenital, spastic or cicatricial entropion.[2] Common pathologic mechanisms include laxity of horizontal and vertical lids, weakening of lid retractors, and overriding of parts of orbicularis oculi muscle.[3] Cicatricial entropion results from scarring and fibrosis of posterior lamella secondary

to a localized or systemic inflammatory condition.[4]

Treatment of cicatricial entropion depends upon the degree of involvement, grade of severity (mild-minimal lid laxity, moderate-scleral show, marked-punctal eversion, and extreme-with scarring), and symptoms of patients affecting one's daily life.[5] A variety of surgical treatment options are in practice worldwide ranging from lash follicle excision[6] for segmental involvement to tarsal fracture & rotation, anterior lamellar recession & blepharoplasty for severe cases.[7]

For very severe disease, posterior lamella needs to be enlarged by release of scar tissue with or without of grafting of a membrane. As with any surgery, cicatricial entropion surgery also has its side effects, one of which is recurrence and over or under-correction thereby affecting the daily life of patients.[8]

The anterior lamellar recession has a good success rate in the treatment of mild to moderate cicatricial entropion. During this procedure, the lid is split by separating skin and orbicularis muscle from the tarsal plate followed by the recession of the anterior lamella. If there is excess skin overhanging the lids margin, it may compromise the surgical success rate so additional blepharoplasty may be done for such cases.[9]

Aghai et al[10] in their prospective interventional case series documented 75% success rate of anterior lamellar recession & blepharoplasty for cicatricial entropion. However, no local study on this topic was found which prompted the authors to carry out this research.

Materials and Methods:

This quasi-experimental study was conducted from 1st February 2022 to 30th June 2023 at the Institute of Ophthalmology, Mayo hospital, Lahore after obtaining ethical approval vide no 2165/2022. A sample size of 18 was calculated by using a 5% level of significance and 80% power of the study by considering aesthetic outcome as 0.318 and 0.773 in both groups.[11]

Eighteen subjects above 40 years of age, presenting to the Institute of Ophthalmology and diagnosed with cicatricial entropion were selected for surgery. Subjects who did not give consent and those who had ectropion and entropion other than cicatricial variant were excluded. The subjects were divided into two groups namely 1 and 2. Group 1 patients underwent anterior lamellar recession alone while group 2 had anterior lamellar recession combined with blepharoplasty. Patients diagnosed with any coexisting senile entropion, or ectropion were excluded from the study.

All patients underwent surgery under local anesthesia. After aseptic measures, an incision was made with the help of a blade and scalpel at the grey line extending from the punctum towards the lateral canthus. The second incision was made at the skin crease followed by blunt dissection till the tarsal plate communicated with the grey line incision. The recession of the anterior lamella was done 4 mm and was subsequently sutured to the tarsal plate. Later, the skin crease incision was closed. In group 2, additional markings for blepharoplasty were made and skin plus orbicularis from that area were excised. Patients were advised to use antibiotic eye drops, lubricant eye drops and antibiotic/steroid combination skin ointment for incision for two weeks. Patient Satisfaction was assessed in terms of relieving of patient's symptoms on history. Data were entered and analyzed in SPSS version 25. Descriptive statistics were presented as frequency and percentages. A p-value of less than 0.05 was considered significant and was checked by applying Fischer's exact test.

Results:

Demographic characteristics revealed comparable mean ages between the groups, with Group 1 averaging 55.2 ± 5.26 years and Group 2 averaging 56.7 ± 4.35 years. In

terms of gender distribution, both groups exhibited a slight male predominance, with 55.6% males and 44.4% females in Group 1 and 44.4% males and 55.6% females in Group 2 (Table 1).

Post-operative success rates demonstrated notable differences between the two groups. Group 2, which underwent anterior lamellar recession with blepharoplasty, exhibited higher rates of complete success (77.8%) compared to Group 1 (44.4%). However, Statistical analysis indicated a p-value of 0.43, suggesting no significant difference between the groups in terms of post-operative success, as shown in Table 2. Regarding patient satisfaction, Group 2 also showed higher levels of satisfaction, with 77.8% of patients reporting satisfaction compared to 44.4% in Group 1. Statistical analysis yielded a p-value of 0.43, indicating no significant difference in patient satisfaction between the groups (Table 2).

Aesthetic outcomes favored Group 2, with 66.7% of patients in this group rated as having a good aesthetic outcome, compared to only 22.2% in Group 1. Conversely, 66.7% of patients in Group 1 had fair aesthetic outcomes, while only 33.3% fell into this category in Group 2. Statistical analysis revealed a p-value of 0.153, indicating a trend towards better aesthetic outcomes in Group 2, although not statistically significant (Table 2). When evaluating post-operative success by grade, in Group 1, those with Grade 1 entropion exhibited a success rate of 60%, however, in Group 2, all Grade 1 cases achieved complete success. In Grade 2 cases, both groups had comparable success rates. Regarding age, participants aged 45-55 years in both groups demonstrated similar post-operative success rates, while those above 55 years showed higher success rates in Group 2, although not statistically significant.

In summary, while there were some trends favoring anterior lamellar recession with blepharoplasty, particularly in Grade 1 cases and in certain demographic groups, the differences were not statistically significant. Further research with larger sample sizes may provide additional insights into the effectiveness of these surgical techniques.

Table 1- Demographic characteristics of the study participants

Group	Age in years (Mean ± SD)	Gender n (%)	
		Male	Female
1(without)	55.2 ± 5.26	5 (55.6%)	4 (44.4%)
2 (with)	56.7 ± 4.35	4 (44.4%)	5 (55.6%)

Table 2- Post-Operative Success, Patient Satisfaction, Aesthetic Outcome

	Group 1 (without) n = 9	Group 2 (with) n = 9	P- value
Post-Operative success			
Complete	4 (44.4%)	7 (77.8%)	
Partial	3 (33.3%)	2 (22.2%)	0.43
Failure	2 (22.2%)	0 (0.0%)	
Patient Satisfaction			
Satisfied	4 (44.4%)	7 (77.8%)	
Partially Satisfied	3 (33.3%)	2 (22.2%)	0.43
Not Satisfied	2 (22.2%)	0 (0.0%)	
Aesthetic Outcome			
Good	2 (22.2%)	6 (66.7%)	
Fair	6 (66.7%)	3 (33.3%)	0.153
Poor	1 (11.1%)	0 (0.0%)	

Fisher's exact test was applied to check for statistical significance. P values of less than 0.05 were considered significant.

Table 3- Comparison of post-operative success stratified over age, gender and grade

	Group 1 (without) n = 9			Group 2 (with) n = 9			P-value
	Post-Operative success			Post-Operative success			
	Complete	Partial	Failure	Complete	Partial	Failure	
Grade							
Grade 1	3 (60%)	1 (20%)	1 (20%)	5 (100%)	0 (0%)	0 (0%)	0.44
Grade 2	1 (25.0%)	2 (50.0%)	1 (25.0%)	2 (50.0%)	2 (50.0%)	0 (0%)	1.00
Age							
45-55 Years	3 (60%)	2 (40.0%)	0 (0.0%)	2 (66.7%)	1 (33.3%)	0 (0.0%)	1.00
>55 years	1 (25.0%)	1 (25.0%)	2 (50%)	5 (83.3%)	1 (16.7%)	0 (0.0%)	0.11
Gender							
Male	1 (20%)	3 (60%)	1 (20%)	4 (100%)	0 (0.0%)	0 (0.0%)	0.08
Female	3 (75%)	0 (0.0%)	1 (25%)	3 (60%)	2 (40%)	0 (0.0%)	0.44

P values were calculated using Fisher's exact test

Table 4- Comparison of Patient satisfaction stratified over age, gender and grade.

	Group 1 (without) n = 9			Group 2 (with) n = 9			P-value
	Patient satisfaction			Patient satisfaction			
	Satisfied	Partially satisfied	Not satisfied	Satisfied	Partially satisfied	Not satisfied	
Grade							
Grade 1	4 (80%)	0 (0.0%)	1 (20%)	5 (100%)	0 (0.0%)	0 (0.0%)	1.00
Grade 2	0 (0.0%)	3 (75%)	1 (25%)	2 (50%)	2 (50%)	0 (0.0%)	0.42
Age							
45-55 Years	3 (60%)	2 (40%)	0 (0.0%)	2 (66.7%)	1 (33.3%)	0 (0.0%)	1.00
>55 years	1 (25%)	1 (25%)	2 (50%)	5 (83.3%)	1 (16.7%)	0 (0.0%)	0.11
Gender							
Male	2 (40%)	2 (40%)	1 (20%)	4 (100%)	0 (0.0%)	0 (0.0%)	0.28
Female	2 (50%)	1 (25%)	1 (25%)	3 (60%)	2 (40%)	0 (0.0%)	1.00

P values were calculated using Fisher's exact test

Table 5- Comparison of Aesthetic Outcome stratified over age, gender and grade.

	Group 1 (without) n = 9			Group 2 (with) n = 9			P- value
	Aesthetic Outcome			Aesthetic Outcome			
	Good	Fair	Poor	Good	Fair	Poor	
Grade							
Grade 1	2 (40%)	3 (60%)	0 (0.0%)	4 (80%)	1 (20%)	0 (0.0%)	0.52
Grade 2	0 (0.0%)	3 (75%)	1 (25%)	2 (50%)	2 (50%)	0 (0.0%)	0.42
Age							
45-55 Years	1 (20%)	4 (80%)	0 (0.0%)	2 (66.7%)	1 (33.3%)	0 (0.0%)	0.46
>55 years	1 (25%)	2 (50%)	1 (25%)	4 (66.7%)	2 (33.3%)	0 (0.0%)	0.33
Gender							
Male	1 (20%)	4 (80%)	0 (0.0%)	2 (50%)	2 (50%)	0 (0.0%)	0.52
Female	1 (25%)	2 (50%)	1 (25%)	4 (80%)	1 (20%)	0 (0.0%)	0.28

P values were calculated using fisher's exact test

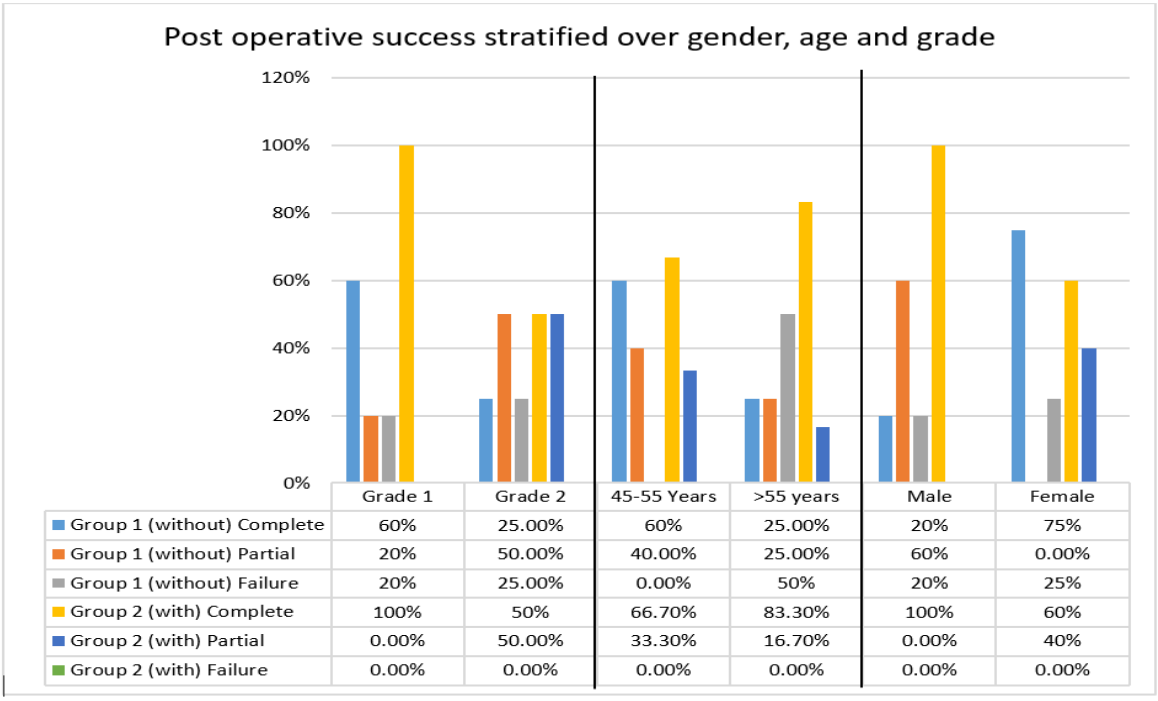
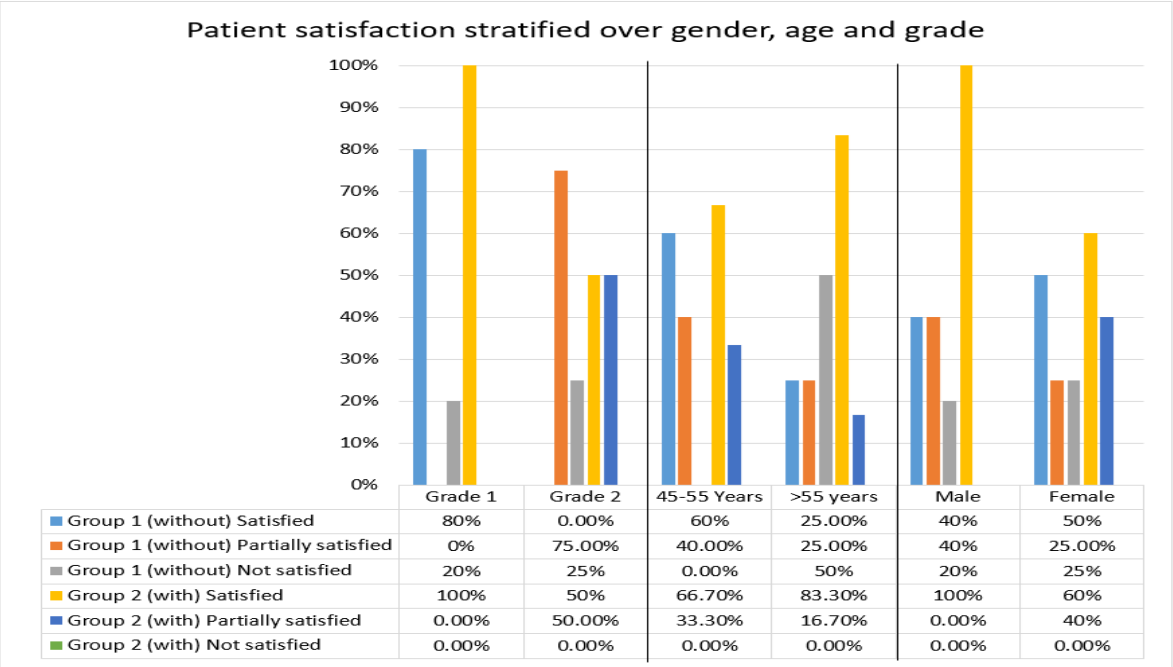


Figure 1. Post operative success of both groups stratified over gender, age and entropion grade.



	Grade 1	Grade 2	45-55 Years	>55 years	Male	Female
Group 1 (without) Satisfied	80%	0.00%	60%	25.00%	40%	50%
Group 1 (without) Partially satisfied	0%	75.00%	40.00%	25.00%	40%	25.00%
Group 1 (without) Not satisfied	20%	25%	0.00%	50%	20%	25%
Group 2 (with) Satisfied	100%	50%	66.70%	83.30%	100%	60%
Group 2 (with) Partially satisfied	0.00%	50.00%	33.30%	16.70%	0.00%	40%
Group 2 (with) Not satisfied	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Figure 2. Patient satisfaction in both groups stratified over gender, age and entropion grade.

Discussion:

Gawdat T and colleagues[12] carried out a retrospective analysis of patients who underwent anterior lamellar recession for treatment of cicatricial entropion and evaluated surgical success and aesthetic outcomes in terms of patient satisfaction. They reported 96.8% patient satisfaction rate in terms of cosmetic outcomes. None of the cases was diagnosed postoperatively by entropion or lagophthalmos. However, 5.2% of cases had flap necrosis.

Awny I[13] in a prospective randomized study compared the success rate of two surgical techniques for correction of upper eyelid cicatricial entropion. The techniques were anterior lamellar recession versus tarsal fracture and rotation. A 70% percent success rate was reported in patients who underwent anterior lamellar recession as no skin was touching the globe. In contrast, tarsal fracture technique yielded a 50% success rate. In another prospective interventional research, El Samkary MA[14] compared success and aesthetic outcomes after anterior lamellar recession with and without blepharoplasty. It was reported that anterior lamellar recession reported 100% success and aesthetic outcomes when done with blepharoplasty. Anterior lamellar recession alone gave 70% success rate and 60% patient satisfaction in their study.

Chan KK and associates[15] studied the long-term success rate and safety of combined surgery for cicatricial entropion and blepharochalasis. The procedure performed was anterior lamellar recession, tarsal rotation and posterior lamellar advancement. Over a follow up period of four years, no eye developed recurrence of disease. However, lagophthalmos, suture granuloma, trichiasis was noted in 1 patient respectively which was treated subsequently. It was concluded that combined surgery for treatment of cicatricial entropion and blepharochalasis was safe and effective. In another research, Mohammad Farid Abulnaga A et al[16] compared anterior lamellar recession with and without blepharoplasty for treatment of cicatricial entropion. The results showed 10% recurrence rate over a follow up period of 3 months in patients who underwent anterior lamellar recession alone as compared to no recurrence when the surgery was done with blepharoplasty.

Singh S and colleagues[17] studied a modified technique for repair of cicatricial entropion. In their study, patients underwent anterior lamellar recession and reconstruction by labial mucosal grafting for spacing the

ciliary margin. Post operatively only one patient was noted having focal trichiasis of eye lashes which was accordingly treated.

In a randomized controlled trial, Abdelaziz FM et al[18] compared anterior lamellar recession with posterior lamellar tarsal rotation for treatment of cicatricial entropion. Post-operative trichiasis was higher in those who underwent posterior tarsal rotation (14.3% vs 0%; p= 0.048, 25% vs 0%; p= 0.004, 35.7% vs 10%; p= 0.019, respectively). In a similar study, Ezzeldin ER and associates[19] anterior lamellar recession with bilamellar tarsal plate rotation for upper eyelid trichiasis. In the immediate postoperative period and on subsequent follow-ups, the anatomical correction rate was better in the anterior lamellar recession group while the tarsal rotation group had cases of under and over-correction. Researchers concluded that anterior lamellar recession was superior to tarsal rotation in the management of cicatricial entropion.

Sendul SY and colleagues[20] studied another technique in which they assessed results of anterior lamellar recession augmented with anterior tarsal rotation. The most recurring symptoms before surgery were watering, irritation in the eyes and photophobia. Ten patients had corneal opacity and erosion, and 1 patient had only epithelial erosion. Postoperatively, all patient's pre-operative symptoms had been resolved with none of them reporting eyelid contour disorders, ectropion, or recurring entropion.

In a video correspondence to a research journal, Adewara B and Singh S[21] emphasized that anterior lamellar recession combined with mucous membrane grafting yields better results and proposed that it should be done in all cases of cicatricial entropion for good aesthetic outcome.

Conclusion:

There is no significant difference between anterior lamellar recession with blepharoplasty and without blepharoplasty for upper eyelid cicatricial entropion in the context of aesthetic outcomes, patient satisfaction and surgical success rate.

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Authors Contribution

Concept and Design: Muhammad Shaheer
Data Collection / Assembly: Asima Rafique
Drafting: Muhammad Shaheer
Statistical expertise: Asima Rafique
Critical Revision: Muhammad Shaheer

ORIGINAL ARTICLE

Obesity, Physical Inactivity, and Duration of Diabetes Mellitus as Risk Factors for Multiple Sessions of Retinal Photocoagulation

Muhammad Kamran Khalid[1], Muhammad Marwat[2], Muhammad Sharjeel[3], Muhammad Usman Awan[3], Uroosa Kanwal[3]

Abstract:

Objectives: Diabetic retinopathy (DR) is evolving as one of the leading causes of legal blindness worldwide. There is an immense need for the prevention of this potentially blinding disorder. Research has been going on to determine modifiable risk factors to decrease the progression of DR. More advanced cases of DR need pan-retinal photocoagulation (PRP) for the prevention of potentially blinding complications of DR.

Our study aimed to evaluate obesity, physical inactivity, and duration of DM as risk factors for multiple PRP sessions and the severity of DR.

Methods: This was a cross-sectional comparative study conducted at the Department of Ophthalmology, Gomal Medical College, Dera Ismail Khan, Pakistan from January 2021 to June 2021. The sample consisted of consecutive patients of pan-retinal photocoagulation (PRP) laser procedures during this period at the Eye Unit, DHQ Teaching Hospital, Dera Ismail Khan, Pakistan.

Results: A total of 168 patients undergoing laser procedures were included in the study. Out of these 104 (61.9%) were male and 64 (38.1%) were female. Obesity and duration of DM >5 years were found to be statistically significant ($p<0.05$) risk factors for multiple PRP sessions and severity of DR, whereas physical inactivity was not a statistically significant risk factor for multiple PRP sessions.

Conclusion: Obesity and duration of DM >5 years are significant risk factors for multiple PRP sessions in our setup. Efforts should be made to control all modifiable risk factors for the prevention of the sight-threatening complications of DR. *Al-Shifa Journal of Ophthalmology 2024; 20(3): 101-105. © Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.*

1. *Gomal Medical College Dera Ismail Khan.*
2. *Muhammad College of Medicine, Peshawar.*
3. *Gomal Medical College Dera Ismail Khan.*

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Correspondence to:
Muhammad Kamran Khalid
Gomal Medical College, Dera Ismail Khan.

Introduction:

Diabetic retinopathy (DR) is the leading cause of blindness in the working-age group globally[1]. International Diabetes Federation has recently released an estimated figure of 537 million diabetics worldwide and 33 million people are affected in Pakistan.

A review study on diabetic retinopathy has estimated that globally 35% of people with diabetes mellitus (DM) had some form of DR, 7% had proliferative diabetic retinopathy (PDR), 7% had diabetic macular edema (DME), and 10% were affected by the vision-threatening stages of diabetic retinopathy[2].

Among other measures, intra-vitreal injections of anti-vascular endothelial growth factors (VEGFs) and Pan-retinal photocoagulation (PRP) procedures have been widely used for the treatment of these vision-threatening complications. These treatment strategies aim to halt further vascular proliferation and exudation on the retina. These modalities cannot revert the tissue damage already caused by the effects of metabolic disturbances of DM. So there is a significant need to prevent tissue damage by controlling the risk factors responsible.

Apart from good metabolic control[3], the duration of DM, associated hypertension[4], smoking, nephropathy, pregnancy, smoking, obesity[5,] and anemia have been associated with the progression of DR and its complications. However, relatively recent studies such as the Action in Diabetes and Vascular Disease (ADVANCE)[3] and the Action to Control Cardiovascular Risk in Diabetes (ACCORD-Eye)[4] have shown a limit to the risk reduction for DR that can be achieved with better glucose and BP management alone, respectively. Also, the evidence supporting the relationship between other modifiable risk factors and the severity of DR is inconclusive[6-9]. There remains a need for retinal photocoagulation for the prevention of vision-threatening complications of DR.

It can easily be understood that the more severe the DR, the more frequent the need for PRP sessions. So, the need for multiple PRP sessions is an indirect indicator of the severity of DR. As our study was conducted on patients being treated with laser PRP for severe DR, it is presumed that patients receiving multiple PRP sessions have more severe DR. Our objective was to determine whether Obesity, Physical Inactivity, and Duration of DM are risk factors for Multiple PRP Sessions in our location.

Materials and Methods:

This was a cross-sectional comparative study conducted at the Department of Ophthalmology, Gomal Medical College, Dera Ismail Khan, Pakistan from January 2021 to June 2021. The sample consisted of consecutive patients receiving Green laser photocoagulation during this period at the Eye Unit, DHQ Teaching Hospital Dera Ismail Khan, Pakistan. Approval from the ethical committee of Gomal Medical College, Dera Ismail Khan was taken before starting the study.

A total of 168 patients receiving Green laser procedures were included in the study using consecutive sampling during this period. Green laser procedures were performed with a mono-spot slit-lamp delivery system, Nidek GYC-1000, Japan in all patients under topical anesthesia using a wide-field Mainster PRP contact lens.

The patients were divided into those who received only one session of PRP (Single PRP Session) and those who received more than one (Multiple PRP Session). Obesity was defined as Body Mass Index (BMI) >30 kg/m^2 and less than 30 were taken as non-obese. Physical inactivity was defined as the absence of exercise with dedicated time and place. Based on the duration of DM, the subjects were divided into those having <5 years and those having ≥5 years duration from the onset of DM.

Patients with other ocular (including dense cataract, glaucoma, uveitis) or systemic (joint disease, end-stage kidney disease) co-morbidities were excluded.

The sample was described by frequency and percentages using SPSS version 20 software. Gender and Age of the patient were the demographic variables and Obesity, Physical inactivity, and Duration of Diabetes were our clinical/research variables. The clinical variables were compared with the number of PRP sessions using the Chi-square test and a p-value <0.05 was taken to be statistically significant.

Results:

A total of 168 patients were included in the study. Out of these 104 (61.9%) were male and 64 (38.1%) were female. Mean age of

the patients was 56.83 ± 12.5 years. The frequency distribution of Obesity, Physical Inactivity, Duration of DM, and PRP Sessions are shown in Tables 1.

Table 1: Frequency distribution

Obesity	Frequency	Percent
Obese	26	15.5%
Non-Obese	142	84.5%
Total	160	100%
Physical Inactivity	Frequency	Percent
Absent	26	15.5%
Present	142	84.5%
Total	160	100%
Duration of DM	Frequency	Percent
<5 years	36	21.4%
>5 years	132	78.6%
Total	160	100%
PRP Sessions	Frequency	Percent
Single PRP Session	88	52.4%
Multiple PRP Sessions	80	47.6%
Total	160	100%

A comparison between the research variables (Obesity, Physical Activity, and Duration of DM) and PRP sessions is shown in Tables 2 to 4 respectively.

Table 2: Comparison of Obesity: PRP Sessions

PRP Sessions	Obesity		Chi-Square	p-value
Single Session	Obese	Non-Obese	10.590	0.001
	6	82		
Multiple Session	20	60		

Table 3: Comparison of Physical Inactivity: PRP Sessions

PRP Sessions	Physical Inactivity		Chi-Square	p-value
Single Session	Absent	Present	1.034	0.309
	16	72		
Multiple Session	10	70		

Table 4: Comparison of Duration of DM: PRP Sessions

PRP Sessions	Duration of DM		Chi-Square	p-value
Single Session	<5 years	>5 years	17.598	0.000
	30	58		
Multiple Session	6	74		

This is evident from the above tables that Obesity (p=0.001) and Duration of DM >5 years (p=0.000) are statistically significant (p<0.05) risk factors for multiple PRP Sessions, whereas Physical Inactivity (p=0.309) is not statistically significant (p>0.05) risk factor for multiple PRP Sessions.

Discussion:

It is evident from Table 2 that Obesity is a statistically significant risk factor for multiple PRP sessions and so for the severity of DR. Dirani et al had concluded that obese people were 6.5 times more likely to have PDR as compared to normal weight[10]. Also, they have shown that higher Body-mass index (BMI) was significantly associated with any DR (p=0.02). Moreover, they have also shown that neck circumference (p=0.03) and waist circumference (p=0.01) were also significantly associated with any DR. In contrast Hwang et al had shown that higher BMI (p=0.001), larger waist circumference (p=0.047) and higher total body fat (p<0.001) were significantly associated with lower risk of vision-threatening DR.

In our study, physical inactivity is not a statistically significant risk factor for multiple PRP sessions (p=0.309) and so, neither for the severity of DR. AlQabandi et al had published an extensive review on this subject in which they have linked decreased sedentary times and more physical activity to the delayed onset and progression of DR and its severity[11]. They also added that physical activity provides both protective and anti-inflammatory effects on the retina.

In our study duration of DM >5 years is a statistically significant risk factor for multiple PRP sessions and so for severity of DR (Table:7). Similar results have been shown by Jenchitr W et al in their study at 10 and 20 years of DM. They have shown that for subjects having less than 10 years of DM, the prevalence of NPDR varied from 13.11% to 22.91% and PDR varied from 2.15% to 2.42%. Whereas subjects having up to 20 years of DM, the prevalence of NPDR was up to 42.86% and PDR was up to 10.20%[12]. Niazi et al have shown the duration of DM as an independent risk factor for both severity and progression of DR (OR 5.7 for 5 to 10 years and 32.3 for more than 10 years in cases of NPDR and OR $2x10^6$ for 5 to 10 years and $2x10^8$ for more than 10 years in cases of PDR.

Conclusions:

Obesity and duration of DM > 5 years are significant risk factors for multiple sessions of PRP and so for severity of DR in our location. Control of modifiable risk factors as much as possible can decrease the risk of progression of DR and so for the need of multiple PRP sessions.

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Author Contribution

Concept and Design: Muhammad Marwat
Data Collection / Assembly: Muhammad Sharjeel
Drafting Muhammad Usman Awan
Statistical expertise: Uroosa Kanwal
Critical Revision: Muhammad Kamran Khalid

ORIGINAL ARTICLE

Refractive Error Among Healthy Infants in Tertiary Eye Care Centre of Nepal

Dr Govind Gurung[1], Krishna Kant Gupta[1], Harikant Sah[1]

Abstract:

Objective: To determine the prevalence of non-physiological Refractive error among all infants attending the hospital.

Methods: This Retrospective cross-sectional study was conducted among healthy infants attending the Department of Pediatric Ophthalmology in Kedia Eye Hospital, Birgunj, Nepal from January 2023 to June 2023. Informed consent from the infant's parents was taken. Cycloplegic refraction was performed using retinoscopy to diagnose the refractive errors. Hyperopia of > + 4.00 D, Myopia of < -1.50 D, and Astigmatism of < -1.75 D were included in the study.

Results: A Total of 966 infants (0-12 months) were enrolled in the study. Number of male and female infants were 594 (61.5%) and 372 (38.5%) respectively (Table 1). The mean age was 6 months. The prevalence of Refractive error in infants was 21.5%. Astigmatism was found in 92 infants (9.5%), Myopia in 62 infants (6.4%), and Hyperopia in 52 infants (5.6%).

Conclusion: Refractive error is one of the major ocular morbidities affecting children. Detecting Refractive errors early in infancy is an advantage to the children's education, quality of life, and social development. Screening all the infants for Refractive errors along with other systemic illness can be recommended. *Al-Shifa Journal of Ophthalmology 2024; 20(3): 106-110.*

1. *R.M. Kedia Eye Hospital, Birgunj, Nepal*

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Correspondence to:
Dr Govind Gurung,
R.M. Kedia Eye Hospital, Birgunj, Nepal.
gurunggovind7819@gmail.com

Introduction:

Refractive errors occur when the shape of the eye prevents light from focusing and forming an image on the retina and if remains uncorrected leads to permanent vision loss. Corrective Spectacles, contact lenses, and Refractive surgeries are the modalities of treatment for errors of refraction. Timely intervention remains the key factor for the management of Refractive Error. Diagnosing early during infancy might enhance the quality of children's lives and future careers. If left uncorrected children may develop amblyopia, disparity in binocular vision, and strabismus leading to visual impairment and blindness in children.[1]

Refractive Error is the second leading cause of preventable visual loss and the first cause of visual impairment. Refractive Error accounts for 43 % of visual impairment worldwide.[2,4] The World Health Organization approximates that 19 million children and adolescents 5 to 15 years of age are having Visual Impairment among

which 12.8 million cases are due to uncorrected refractive errors. Consequences of Uncorrected refractive error may be harmful for children in their educational opportunities, productivity, and overall quality of life since vision develops during infancy.[3]

Many studies have been conducted and published on the Prevalence of Refractive Error in Children in Nepal and worldwide but very few studies on refractive errors in infants. For effective treatment of Refractive error early detection might be helpful. The main objective of the study was to determine the prevalence of Refractive error among all infants attending the hospital.

Materials and Methods:

This Retrospective observational study was conducted among healthy infants attending the Department of Pediatric Ophthalmology at Kedia Eye Hospital, Birgunj, Nepal. Informed consent from the infant's parents was taken and recorded. The hospital's ethical committee provided ethical approval. All the Infants attending the hospital for any vision problem were screened for refractive errors. The ocular motility examination was done using a torch light. Gross eye examination. adnexa and anterior segment inspection was done using a direct ophthalmoscope. Fundus evaluation was completed with indirect ophthalmoscopy and cycloplegic refraction was done using Retinoscope. All infants received 2 drops of 0.5 % of cyclopentolate and refraction was done 40 minutes after installation. This cycloplegic retinoscopy procedure is the gold standard for all children.

All infants attending the hospital were included in the study. Physiological Refractive Error, Children over 1 year of age, Hyperopia of less than + 4.00 D, Myopia of less than -1.50 D. Astigmatism of less than -1.75 D, Premature and low birth weight newborns were excluded. Systematic sampling method was applied in this study.

Results:

A Total of 966 infants (0-12 months) were enrolled in the study. Number of male and female infants were 594 (61.5%) and 372 (38.5%) respectively. (Table 1) .The mean age was 6 months. Refractive error was diagnosed in 208 infants (21.5%). (Table 2) Astigmatism was found in 92 infants (9.5%), Myopia in 62 infants (6.4%), and Hyperopia in 54 infants (5.6%). (.Table 3). Among 208 infants with refractive errors, 150 infants were male (25.2 %) and 58 infants (15.6%) were female. The result of chi square test showed that there was a significant association between gender and refractive Error ($p<0.001$). In infants with Refractive Error Astigmatism was found in 72 male (78.3%) and 20 female (21.7%) infants. Myopia was detected in 42 male (67.7%) and 20 female (31/3%) infants. Hyperopia was the refractive error in 36 (66.6%) male and 18 female (33.7%) infants. There was insignificant association between types of refractive error and gender of patients($p=0.185$) though the results showed that all types of refractive error were found mostly in male patients as compared to female patients.

Table no.1: Frequency distribution of Gender

Gender	Frequency(n)	Percentage (%)
Male	594	61.5
Female	372	38.5

Table no.2: Prevalence of Refractive Error

Refractive Error	Frequency(n)	Percentage (%)
Yes	208	21.5
No	758	78.5

Table no.3: Frequency distribution of types of Refractive Error

Refractive Error	Frequency(n)	Percentage (%)
Hyperopia	54	5.6
Myopia	62	6.4
Astigmatism	92	9.5

Table no.4: Association between Refractive Error and Gender

Gender	Refractive Error		Total	P value
	Yes, n (%)	No, n (%)		
Male	150(25.2)	444(74.8)	594	<0.001
Female	58(15.6)	314(84.4)	372	

Table no.5: Association between Types of Refractive Error and Gender of patients

Refractive error	Male, n (%)	Female, n (%)	Total	P value
Myopia	42(67.7)	20(32.3)	62	0.185
Hyperopia	36(66.6)	18(33.7)	54	
Astigmatism	72(78.3)	20(21.7)	92	

Discussion:

Timely diagnosis and intervention remain the priority in the treatment modality of all types of refractive errors. The major objective of the study was detection of non-physiological Refractive Error in first year of life which can prevent visual impairment and visual loss. In a Meta-analysis done by Jeewnanand Bist et al in Nepalese children Prevalence of refractive errors in Nepalese children was estimated to be 8.4 %. [5]However in our study, Refractive Error was found in 21.5 % of 966 infants. So, this study compared to the meta-analysis done by Jeewanand et al showed that most of the refractive errors might be since birth.

Astigmatism was the major type of refractive error in this study. Among 966 infants 9.5 % had Astigmatism. In a study of changes in Astigmatism between ages of 1 and 4 years of age done by Abrahamsson et al all children (299) had Astigmatism of 1 D and concluded that there was a significant decrease within 4 years of age.[6] Considering the changes in the magnitude of Astigmatism in first and second trimester of infants Astigmatism of < 1.75 D was excluded in our study.

Myopia (near-sightedness) is a condition in which images are formed in front of the retina which causes blurring of vision for far objects and as the eye grows it becomes elongated and more nearsighted. If untreated Myopia leads to serious eye issues later in life. In this study, Myopia was found in 6.4 % of 966 infants which resembles the study done by Lu Huo et al where Myopia was detected in 5.1 % of 583 infants.[7] In our study the age taken was 0-12 months whereas in the study done by Huo et al infants of age 1-18 months were included. Also, the infants with low birth

weight and premature newborns were excluded from this study so the results of Myopia in infants in this study do not coincide with the results of Quinin et al which concluded that myopia can be strongly predicted by low birth weight and retinopathy of prematurity. [8]

Eyeballs at birth are Hyperopic due to shorter axial length and this condition resolves as the eye grows which is known as Physiological farsightedness. In the study done by Semeraro et al values between $+0.50 \leq D \leq +4.00$ was considered as physiological refraction at birth and they concluded that 88.03 % of 12427 newborn were in this range. [1] In our study the infants with Hyperopia of less than +4.00 D were excluded. The prevalence of Hyperopia in our study was 5.6 % of 966 infants of age =12 months. In the study done by Yahya et al in Malaysia prevalence of Hyperopia was 12 .7 %. However, the age range involved in the study of Yahya et al was 6- 36 months and the number of children were 151. [9]

Refractive error prevalence in boys and girls was 25.2 % and 15.6 % respectively with p-value of < 0.001. In this study of 966, only 38.5% of girls were screened which might be the reason for the higher prevalence in boys. This also explains that parents are more concerned about the health aspects of boys more than girls.

The small sample size, unable to convince many parents for cycloplegic refraction, and lack of coordination with other hospitals and pediatricians are the limitations of our study. A larger sample size with the involvement of other districts of Nepal would have added accuracy in data and the results.

Conclusion:

Astigmatism, Myopia, and Hyperopia are the major causes of non-physiological Refractive Error in Infants. Diagnosing refractive error in Infancy might be an advantage to all parents who are always concerned about their child's future objectives. Refractive error is one of the major ocular morbidities affecting children. Detecting Refractive error early in infancy is an advantage to the children's education, quality of life, and social development. Screening all the infants for Refractive error along with other systemic illness can be recommended.

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Authors Contribution

Concept and Design: Dr Govind Gurung
Data Collection / Assembly: Krishna Kant Gupta
Drafting: Harikant Sah
Statistical expertise: Krishna Kant Gupta
Critical Revision: Dr Govind Gurung

ORIGINAL ARTICLE

Comparison of Central Corneal Thickness Using Ultrasound and Optical Pachymetry

Nashmia Jalil Malik[1], Muhammad Azam Khan[1], Irfan Aslam Khattak[1], Ayisha Shakeel[1], Huma Zainab[1], Maria Saleem[1]

Abstract:

Objectives: To compare the mean difference in Central Corneal Thickness (CCT), between Standard Ultrasound Pachymetry and Optical Biometry scans, in healthy individuals.

Materials and Methods: This cross-sectional study was carried out from 01-02-2023 to 31-07-2023, using non-probability consecutive sampling, at the Department of Ophthalmology, PAF Hospital E-9 Islamabad. A sample size of 100 eyes was calculated, using the WHO calculator. First, the participant's CCT was measured using an Optical biometry AL Scan. Then the same participant's ultrasound pachymetry was performed and the results were compared.

Results: A total of 50 (100 eyes) participants were included in the study. With 33 (66%) male and 17 (34%) female participants. The mean age of the participants was 21.92±4.024 years, the mean Ultrasound CCT was 554.04±38.674 μm, and the mean Optical CCT was 539.45±35.666 μm. The mean difference in ultrasound and optical CCT was 15.09±10.309 μm. The paired samples t-test showed that the mean ultrasound CCT of 554.04±38.674 μm was greater than the mean optical CCT of 539.45±35.666 μm, and the difference was statistically significant ($p < 0.05$).

Conclusion: Even though the CCT measurements between ultrasound and optical pachymetry are comparable and repeatable, they cannot be used interchangeably in follow up visits in clinics. The study also proved a linear correlation between the two modalities, in which if one reading increases, the other increases as well, and vice versa. The CCT measurements by optical pachymeter were lower than by USP (Ultrasound Pachymeter). *Al-Shifa Journal of Ophthalmology 2024; 20(3): 111-118. © Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.*

1. *PAF Hospital, Main Margalla Road, E-9, Islamabad; PAF Hospital.*

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Correspondence to:
Correspondence to:
Nashmia Jalil Malik,
PAF Hospital, Main Margalla Road, E-9, Islamabad
Email: nashmiajalilmalik@hotmail.com

Introduction:

A cornea that is in good health along with a layer of tear film above it, is important in offering a good superficial forward refracting plane, preventing the eye from various kinds of infections and guarding the inner sections of the eye. In an adult, the mean horizontal diameter of the cornea is 11.5-12mm[1] whereas vertically the corneal diameter is around 10.5-11mm (Figure 1). The refractive power of the anterior part of the cornea is around +43.00 to +43.50 diopters (D). The shape of the cornea is elliptical, relatively steep at the center, and horizontally smooth at the edges, forming optical system that is aspherical.With the increased awareness of refractive and cataract surgeries, its availability and expertise, the measurement of central corneal thickness (CCT) has become more widely used.[2,3] CCT assessment is also

important due to its effect on intraocular pressure (IOP) measurement, thus, it helps in, differentiating Normal Tension Glaucoma from Primary Open Angle Glaucoma,[4] and their management. CCT is also an important parameter in the diagnosis of corneal diseases such as Keratoconus and Fuch's Endothelial Dystrophy.[5]

For cataract surgeries, CCT is one of the variables in calculating the power of Intraocular Lens (IOL) and selecting patients for Laser in situ Keratomileusis (LASIK), where 300μm is the minimum residual stromal bed necessary to prevent post-op Keratectasia.[6]

There are multiple devices that are used for the measurement of CCT, based on optical and ultrasound modalities.[7] Ultrasound Pachymetry (USP) is the gold standard and the most commonly used technique for measuring CCT. However, it has a few disadvantages, it requires direct contact of the ultrasound probe with the anterior corneal surface, needs topical anesthesia, has an increased risk of transmission of infection, and for best results, corneal indentation must be done on the same point of the cornea which may lead to corneal epithelial damage. Furthermore, many times the user is unable to centralize the probe or the patient unable to fixate the gaze, leading to inaccurate measurements.[8] Therefore, now different devices are being used to measure CCT, with methods that provide quick, repeatable, and interchangeable measurements.[9] These include Pentacam Corneal Topographer, Anterior Segment optical coherence tomography (AS-OCT), and non-contact tonopachymeter.[10] In a study conducted by Biomedical Department, Course of Optics and Optometry, University of West Attica, Athens, The mean±SD (standard deviation) of central corneal thickness by ultrasound pachymetry (PachPen Handheld Pachymeter, Keeler Instruments Inc), ocular biometry (IOL Master 700 Swept Source Biometry, Zeiss) and Angiovue optical coherence tomography (Optovue Avanti RTVue XR Angiovue) were 547.26±44.24 μm, 551.36±48.87 μm, and 536.42±40.35 μm, respectively. There were statistically significant differences in the measurement results among the 3 methods.[5]

There are diseases in which doctors need to monitor the CCT of their patients in the long run. For this, we need to have access to devices that can be used interchangeably and have good repeatability. If this is achieved, then we can use optical devices with full confidence and prevent transmission of infection from one patient to another, as is the drawback for USP. Multiple studies conducted around the globe compare CCT using optical and ultrasound pachymetry, however, very few studies have been conducted in Islamabad specifically and are not conclusive. We aim to compare CCT measurements using Ultrasound Pachymeter and Optical Biometry AL Scan, in Islamabad. To the best of our knowledge, Optical Biometry AL Scan in particular, have not been compared in this part of the world, as yet. So, we assess the intra-operator repeatability of measurement with each device.

Materials and Methods:

This Cross-Sectional Study was carried out at the Department of Ophthalmology, PAF Hospital, Islamabad, from 01-02-2023 to 31-07-2023, after approval from the institute's ethical committee. Non-probability Consecutive sampling was used. Both genders and ages 18-50 years were included, whereas patients with ocular diseases like high myopia, glaucoma, contact lens use, or previous surgeries were excluded, along with the ones having systemic illnesses.

Written consent was taken from all participants. After a detailed history participants underwent visual acuity assessment, subjective and objective refraction, and finally a slit lamp and fundal examination were done.

CCT was then measured, first by non-contact optical pachymetry (NIDEK Optical Biometer AL Scan). Subjects were asked to sit with their chin up and their forehead touching the forehead bar, lateral lid canthus was aligned with the engraved lines on the device. They were asked to look at the fixation target. Multiple images were captured by the device and it measured the CCT. Subjects were told to move back, rest, blink, and then position their heads again, once the device was ready to take new scans. Three consecutive readings were taken and an average CCT was recorded.

Participants were then counselled regarding USP, we used Pocket II One Touch Ultrasound Pachymeter from Quantel Medical, and after 5 minutes topical anesthesia (proparacaine hydrochloride 0.5%) was instilled in both eyes. After 60 seconds the subjects were told to look at a far target, the ultrasound probe was positioned right at the center of the cornea, CCT was measured 3 times, and an average was taken. The probe was then sterilized to avoid transmission of infection. Optical and ultrasound CCT measurements were taken by different personnel to avoid bias. Optical results were not shared with the person taking ultrasound CCT. However, the same examiner took optical CCT measurements in all participants and the other person remained consistent in taking ultrasound CCT measurements from all participants. This was to prevent differences in readings due to examiner bias.

To avoid diurnal variation in the corneal thickness, all measurements were taken at least 3 hours after waking up (between 10 am to 2 pm).

The collected data were entered and then analyzed using SPSS version 24.0. All the quantitative variables, such as age, K-readings, and CCT (using ultrasound and optical pachymetry) were shown as mean and SD. Whereas, frequency and percentage were used to show qualitative variables like gender, type of refractive error (if any), and the anatomical side of the eye. Mean CCT was compared by Paired sample t-test. A p value ≤ 0.05 was taken as significant. Data was stratified for gender, age, anatomical side and refractive error. After stratification, Paired sample t-test was applied for ultrasound and optical CCT.

Results:

A total of 50 participants (100 eyes) were included in the study. With 33 (66%) male and 17 (34%) female participants. Both eyes of all participants were included in the study as they fit in the inclusion criteria, so we had 50 (50%) right eyes and 50 (50%) left eyes. The types of refractive error were Emmetropia in 54 eyes (54%), Myopia in 20 eyes (20%), Hyperopia in 1 eye (1%) and Astigmatism in 25 eyes (25%).

The mean K1 reading was 43.1841±1.43218 Diopters and the mean K2 reading of all the eyes was 44.1570±1.48424 Diopters.

The mean age of the participants was 21.92±4.024 years, the mean Ultrasound CCT was 554.04±38.674 μm, and the mean Optical CCT was 539.45±35.666 μm. The mean difference in ultrasound and optical CCT was 15.09±10.309 μm as shown in Table 1, Figures 1 and 2.

The mean ultrasound CCT of patients with emmetropic eyes was 557.78±37.877 μm, those with myopic eyes was 540.90±42.603 μm, in the 1 hyperopic eye it was 606.00 μm and lastly in the astigmatic eyes it was 554.40±35.732μm. The mean optical CCT in patients with emmetropic eyes was 542.74±35.695 μm, in those with myopic eyes was 528.60±35.652 μm, in the 1 hyperopic eye it was 589.00 μm and lastly in the astigmatic eyes it was 5539.04±34.675μm. The mean difference in CCT in patients with emmetropic eyes was 15.96±10.211 μm, in those with myopic eyes, was 12.30±11.188 μm, in the 1 hyperopic eye it was 17.00 μm and lastly in the astigmatic eyes it was 15.09±10.309μm.

The mean ultrasound CCT of patients in their right and left eyes was 553.94±39.449 μm and 554.14±38.284 μm respectively. The mean optical CCT in patients in right

and left eyes was 540.80±35.550 µm and 538.10±36.091 µm respectively. The mean difference in CCT in patients in right and left eyes was 13.50±10.041 µm and 16.68±10.428 µm respectively.

The mean ultrasound CCT in the eyes of males and females was 553.30±42.931 µm and 555.47±29.216 µm respectively. The mean optical CCT in the eyes of males and females was 537.41±9.39.160 µm and 543.41±27.771 µm respectively. The mean difference in CCT in the eyes of males and females was 15.89±9.552 µm and 13.53±11.634 µm respectively.

The data was stratified for age. Group 1 had participants from 18 to 24 years while group 2 had people from 25 to 31 years of age. The mean ultrasound CCT for Group 1, which had 74 eyes, was 553.32±42.133 µm and Group 2, having 26 eyes, was 556.08±27.086 µm. The mean optical CCT for Group 1 was 539.09±38.771 µm and for Group 2 was 540.46±25.433 µm. The mean difference in CCT in Groups 1 and 2 was 14.91±10.467 µm and 15.62±10.028 µm respectively.

Paired samples t-test showed that the mean ultrasound CCT (M= 554.04, SD= 38.674 µm) was greater than the mean optical CCT (M= 539.45, SD= 35.666 µm); $p < 0.05$ and the difference was statistically significant, as shown in Table 2.

The two modalities, ultrasound pachymeter and optical pachymeter (AL Scan) also show a statistically significant linear correlation (r= 0.958), as shown in Table 3 and Figure 3.

Table 1: Descriptive statistics

Descriptive statistics	Mean	Standard deviation
Age (years)	21.92	4.024
Ultrasound CCT (µm)	554.04	38.674
Optical CCT (µm)	539.45	35.666
Difference (µm)	15.09	10.309

Table 2: Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Ultrasound - Optical	14.590	11.127	1.113	12.382	16.798	13.112	99	.000

Table 3: Pearson Correlation

Correlations		
		Optical
Ultrasound	Pearson Correlation	.958**
	Sig. (2-tailed)	.000
	N	100
**. Correlation is significant at the 0.01 level (2-tailed).		

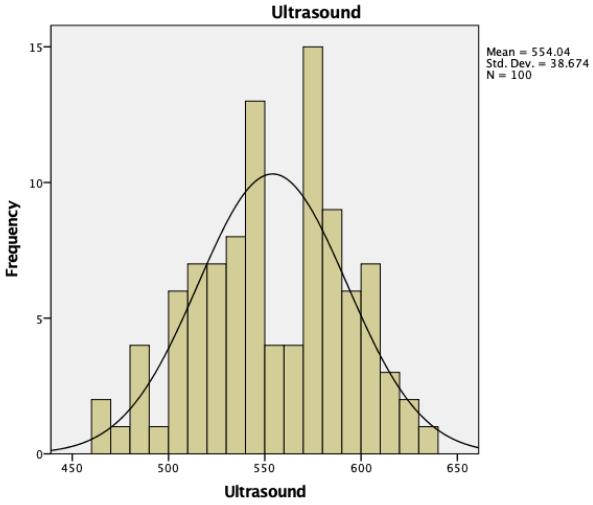

Figure 1: Histogram showing ultrasound CCT of participants

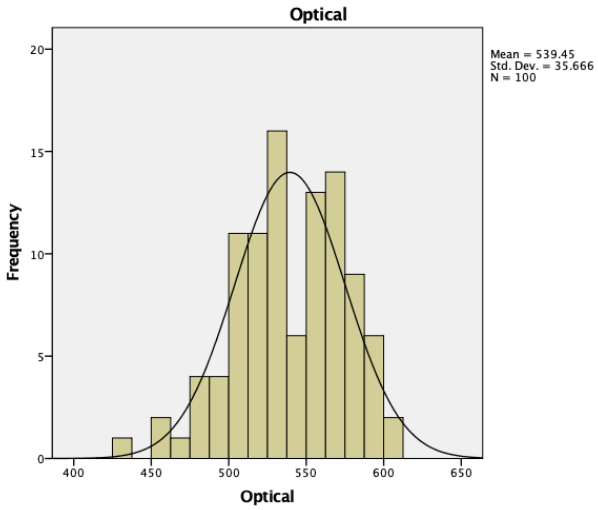

Figure 2: Histogram showing optical CCT of participants

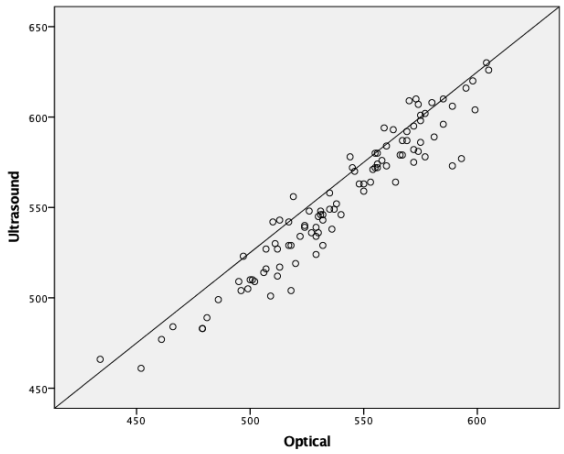

Figure 3: Scatter Plot showing Ultrasound vs Optical CCT

Discussion:

The gold standard investigation for central corneal thickness is ultrasound pachymetry.[11] However, it has been replaced largely by different devices containing optical pachymeter. Most of the clinical studies have analysed that ultrasound and optical pachymetry even though comparable, cannot be used interchangeably.[12]

Repeatability is the ability of a device to give similar results at separate occasions. Whereas interchangeability is when similar results are achieved by using two different devices, for example for CCT measurement at follow up visits. Thus, in our study, optical and ultrasound pachymetry are compared.

In the current study the mean ultrasound CCT (Pocket II One Touch Ultrasound Pachymeter), optical CCT (by NIDEK Optical Biometer AL Scan) and the mean difference in CCT were 554.04±38.674 μm, 539.45±35.666 μm and 15.09±10.309 μm respectively. This was in agreement with the study by Pateras et al, [5] which showed

that their mean ultrasound CCT (PachPen Handheld Pachymeter) was 547.26 ± 44.24 μm and with optical biometry (Zeiss IOL Master 700), 531.36 ± 48.87 μm, with the mean difference in CCT being 15.90 μm.

Our study showed that CCT with the two methods was repeatable and comparable as shown by Şimşek et al. [13] other optical devices also show a good correlation with USP.

Üçer et al compared three devices, all having the optical principle, and their result was statistically significant, with all three devices correlating closely.[7]

CCT assessment is also important due to its effect on intraocular pressure (IOP) measurement, thus, it helps in, differentiating Normal Tension Glaucoma from Primary Open Angle Glaucoma, and their management. For this reason, glaucoma patients were included in a study by Babbar et al.[14] There was a strong correlation among the three modalities that were tested. A study by Jiang et al[8] showed that interchangeability was low even between two optical devices like Zeiss IOL Master 700 and Tomey EM-3000 let alone between ultrasound and optical pachymetry, as is proven in our present study.

In contrast, Maloca et al studied USP with six other optical devices, the results showed inter-device variability as high as 120μm, but showed that OCT based devices showed better results than the other optical devices.[15]

Other studies also show repeatability in the ultrasound pachymetry,[16] but they advised using the same device on follow-up visits. However, the fact that ultrasound pachymeter is observer-dependent, other studies concluded that its reliability may be good, but it may show deviation between examiners. The fact that USP depends on the topical anesthetic also affects the CCT, some studies report up to 10μm.[10]

For cataract surgeries, CCT is one of the variables in calculating the power of Intraocular Lens (IOL) and selecting patients for Laser in situ Keratomileusis (LASIK), where 300μm is the minimum residual stromal bed necessary to prevent post op Keratectasia.[17]

Although USP is the gold standard for measuring CCT, it has a few disadvantages, it requires direct contact of the ultrasound probe with the anterior corneal surface, needs topical anesthesia, it has an increased risk of transmission of infection, for best results corneal indentation must be done on the same point of the cornea and it may lead to corneal epithelial damage. Furthermore, many times the user is unable to centralize the probe or the patient unable to fixate the gaze, leading to inaccurate measurements.[8] Therefore, now different devices are being used to measure CCT, with methods that provide quick, repeatable, and interchangeable measurements.[9] However, our current study proved that the CCT measured by optical pachymeter, although repeatable and comparable cannot be used interchangeably, since the Paired samples t-test showed that the mean ultrasound CCT (M= 554.04, SD= 38.674 μm) was greater than the mean optical CCT (M= 539.45, SD= 35.666 μm); $p < 0.05$ and the difference was statistically significant. The two modalities, ultrasound pachymeter and optical pachymeter (AL Scan) also show a statistically significant linear correlation (r= 0.958), which means that the CCT measurements from the two devices are directly proportional to each other. However, the study was conducted in a single setup, which limits it being generalized.

Conclusion:

Even though the CCT measurements between ultrasound and optical pachymetry are comparable and repeatable, they cannot be used interchangeably in follow up visits in clinics. The study also proved a linear correlation between the two modalities, in which if one reading increases, the other increases as well and vice versa. The CCT measurement by optical pachymeter were lower than by USP.

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Authors Contribution

Concept and Design: Muhammad Azam Khan
Data Collection / Assembly: Irfan Aslam Khattak
Drafting: Ayisha Shakeel, Huma Zainab
Statistical expertise: Maria Saleem
Critical Revision: Nashmia Jalil Malik

CASE REPORT

Ocular features of A Rare Case of Noonan Syndrome in a Pakistani Population

Murtaza Sameen Junejo[1]

Abstract:
A heterogenous congenital disorder characterized as Noonan syndrome (NS), presents with typical features like a triangular face, short stature, and cardiac defects. It typically presents as an autosomal dominant trait. Noonan syndrome is one of the RASopathies due to the involvement of the RAS-MAP-Kinase pathway. Diagnosis is based on clinical features that include, typical facial features (triangular face, hypertelorism, ptosis), skeletal abnormalities(scoliosis), short stature, mild developmental delay, presence of cardiac defects, lymphatic dysplasia, and a family history of NS. Here we report a case of 12 years old boy with bilateral upper eyelid ptosis. On detailed examination, it turned out to be Noonan Syndrome.
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Correspondence to:
Murtaza Sameen Junejo
Armed Forces Institute of Ophthalmology.
drmurtazasameen@gmail.com

Introduction:

Noonan Syndrome (NS)is a congenital disorder with a prevalence of 1:1000 to 1:2500. Mostly it occurs as an autosomal dominant trait. NS is familial in less than 50% of cases. In 2001, the first gene to be connected with Noonan syndrome is PTPN11, while 20 other genes have been discovered, related to this heterogenous clinical condition.[1] Out of 3 RASopathies, Noonan syndrome is considered to be among one of them.

Short stature is one of the main features of this syndrome.[1-2] The syndrome includes several features: Dysmorphic facial features, heart defect, short stature, chest deformity, developmental delay, cryptorchidism, delayed puberty, ptosis, hypertelorism, hand contractures, and hearing problems.[2,3]

The aim of discussing this case is to inform and acquaint ophthalmological community and health care professionals about the signs and symptoms of this rare syndrome.

Case Report:

A 12-year-old boy presented to Armed Forces Institute of Ophthalmology with drooping of both upper eyelids since birth. It was noticed by parents due to his abnormal head posture. There was no history of trauma, redness, photophobia, ocular allergies, or ocular medicines. He has 1 sister of 4 years of age, who also had the same symptoms since birth. While personal history and socioeconomic history were non-contributory.

On general physical examination, a short-stature boy with a lean build and contracted fingers and vertebral problems was standing comfortably and was well-oriented in time, place, and person. Visual acuity was 6/6 OU. An increased intercanthal distance was noticed between two eyes along with drooping of both upper eyelids (hypertelorism and ptosis) and poor levator function (3mm) while rest of anterior and posterior segment examination was within normal limits. He also had triangular face with low set ears and small jaw along with vertebral abnormality like scoliosis. Bilateral hand contractures (Clinodactyly, Brachydactyly, and Blunt fingers) were also present in our patient(Fig 1 A-F, Fig 2). No cardiomyopathy like ASD (atrial septal defect) was noticed in this subject. He was suffering from deafness, for which he was referred to an E.N.T specialist.

Bilateral Upper eyelid ptosis was corrected with a frontalis sling procedure under GA, to prevent amblyopia and correct his head posture (Fig 3).

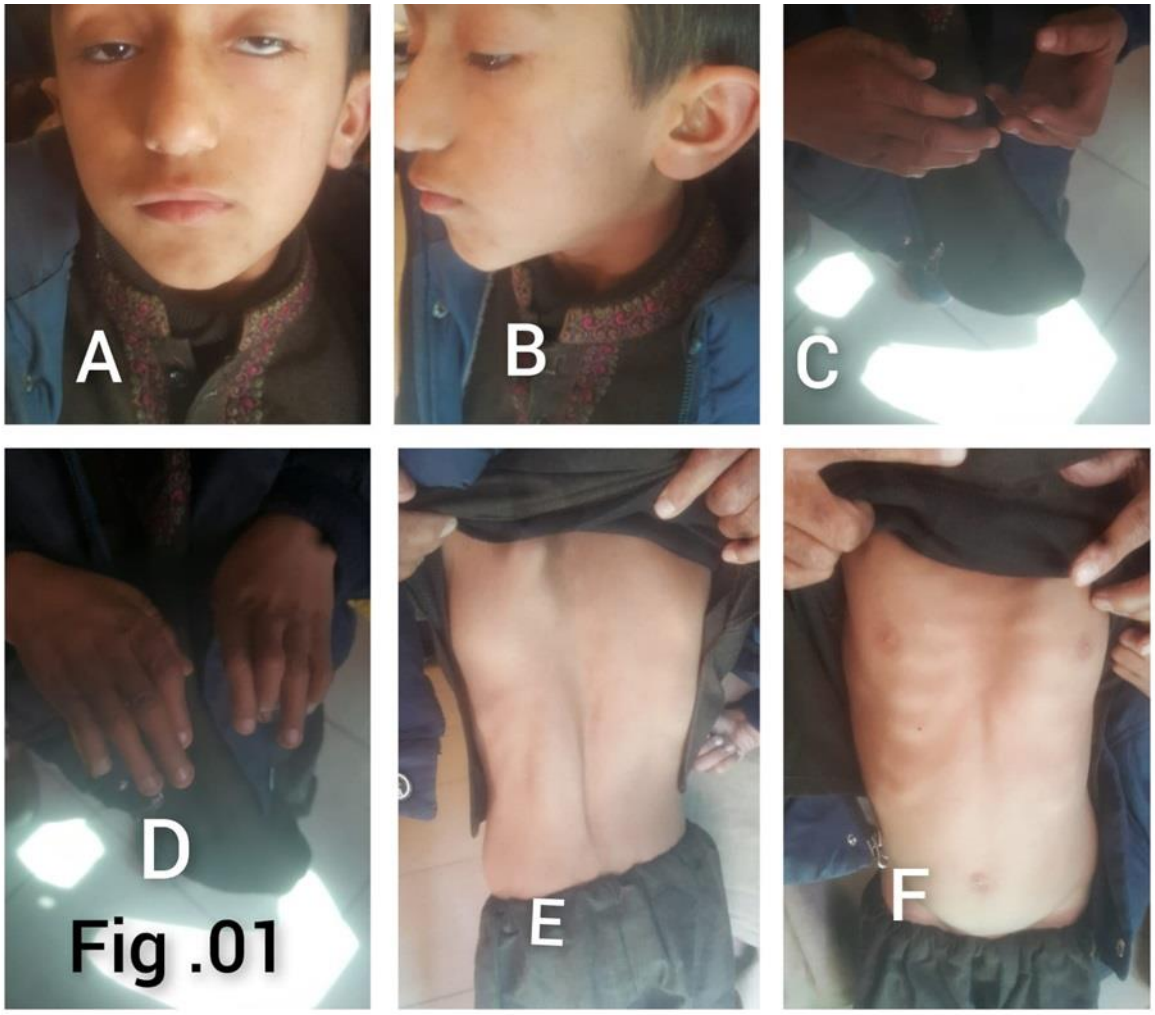

Fig: 1 A) Bilateral Ptosis with hypertelorism B) Low set ears C & D) Hand Contractures (Clinodactyly, Brachydactyly and Blunt fingers) E) Scoliosis F) Pectus Excavatum

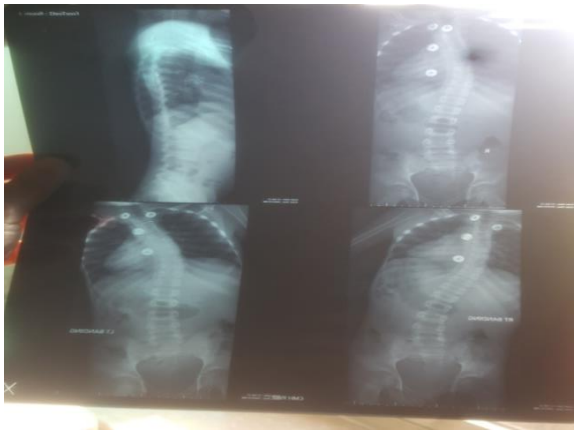

Figure 2: Xray Chest showing Scoliosis

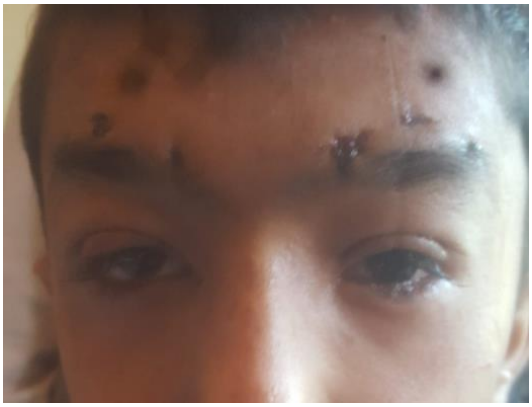

Figure 3: Frontalis Sling Procedure

Discussion:

In 1963, Noonan described many features that were also common in Lentigines syndrome, so the name Noonan was labeled. The same pleiotropic gene has been observed in both syndromes (Noonan and Lentigines).[4]

It has been observed that a patient with Noonan syndrome requires a multidisciplinary team approach to treat and manage this rare syndrome. We also sent our patient to a cardiologist, dermatologist, Endocrinologist, E.N.T specialist, orthopedic surgeon, and pediatrician.

The patient was operated on for bilateral ptosis correction with a frontalis sling procedure under GA in our case report to make his chin-up posture a more comfortable posture and prevent him from developing amblyopia.

Mendez and Optiz in their study confirmed that ocular manifestations are the commonest and consistent features in almost 95%, occurring in Noonan Syndrome. [5]

Marin et al, in their study, also suggest that ocular features account for larger clinical features in Noonan syndrome patients.[6]

The patient we reported here was a young male with ocular and systemic features of Noonan Syndrome.

In summary, NS is a rare disorder with multiple ocular features that should be diagnosed and treated early to prevent vision-threatening complications, therefore long-term follow-up and a multidisciplinary team approach are required.

Increased awareness of Noonan syndrome among ophthalmologists and other health care professionals could help parents/ guardian to seek specialist advice and proper management.

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Authors Contribution

Concept and Design: Murtaza Sameen Junejo
Data Collection / Assembly: Murtaza Sameen Junejo
Drafting: Murtaza Sameen Junejo
Statistical expertise: Murtaza Sameen Junejo
Critical Revision: Murtaza Sameen Junejo