ISSN 3006-2543 (Online)
ISSN 1990-3863 (Print)

AL-SHIFA JOURNAL OF OPHTHALMOLOGY

ASJO

An Open Access, Peer Reviewed, Quarterly Journal of
AL-SHIFA TRUST EYE HOSPITAL

Vol. 19, No. 3, July – September 2023

Indexed in
WHO Index Medicus (IMEMR)
Asian Digital Library (ADL)
Pak Medinet
Pakistan Medical and Dental Council IP/033

ISSN 3006-2543 (Online)
ISSN 1990-3863 (Print)

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Al-Shifa
Journal of Ophthalmology

Vol. 19, No. 3, July – September 2023

QUARTERLY PUBLISHED

Abstracts available at https://www.asjoalshifaeye.org and http://www.pakmedinet.com/ASJO
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Al-Shifa Journal of Ophthalmology

A Journal of
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EDITORIAL

Navigating Hope and Reality: Challenges in Communicating Glaucoma Diagnosis and Prognosis

Mahmood Ali

Breaking bad news is an intricate aspect of the ophthalmologist's role, especially in the realm of glaucoma care, where it is the leading cause of irreversible blindness worldwide. Within Ophthalmology clinics, practitioners often encounter challenging scenarios, such as when end-stage glaucoma patients present seeking advice, hopeful that glasses or cataract surgery will restore their vision. Additionally, in tertiary care ophthalmic settings, patients may arrive with an established glaucoma diagnosis, hoping that advanced treatment facilities will provide solutions to their vision concerns. However, informing these patients about their condition and discussing the irreversible loss of vision due to glaucoma can evoke intense emotions, leading to feelings of hopelessness.[1]

Effective communication, particularly in delivering distressing news, is an essential skill for Ophthalmologists specializing in glaucoma care. While the disclosure of distressing information commonly pertains to end-of-life scenarios, ophthalmologists routinely confront circumstances where revelations could profoundly affect a patient's long-term perspective. These situations may involve unveiling a novel chronic condition or delving into the advancing trajectory of glaucoma despite therapeutic endeavors.

Breaking bad news encompasses a multifaceted task, demanding careful consideration of various elements. Establishing a mental strategy for conveying information, addressing emotions, involving family members, and planning for ongoing care and support becomes more manageable when there's an existing relationship between the ophthalmologist and the patient. Utilizing a structured approach, such as a template or communication protocol, can imbue the process with quality and empathy, even in challenging clinical settings.

The SPIKES Protocol offers a valuable framework for effectively delivering bad news.[2] Developed by Walter Baile and colleagues, this protocol guides healthcare professionals through following essential steps:

Setting up: Establishing an appropriate environment for the conversation, including physical space and timing.

Perception: Understanding the patient's existing knowledge, perceptions, and emotional readiness.

Invitation: Seeking permission from the patient to share information.

Knowledge: Presenting the news clearly and sensitively, tailoring the information to the patient's level of understanding.

Emotions with Empathy: Acknowledging and responding empathetically to the patient's emotions.

Strategy or Summary: Collaborating with the patient to develop a plan for the next steps and ongoing support.

Each step in the SPIKES Protocol is crucial for facilitating effective communication and supporting patients through difficult news. While following a structured protocol may not always be feasible in every clinical scenario, adopting its principles can enhance communication and patient-centered care.

Ensuring proficiency in breaking bad news is essential for ophthalmologists specializing in glaucoma care. Incorporating communication skills training into their education and professional development, through both didactic and experiential learning approaches, can equip them with the tools

they need to navigate challenging conversations effectively.[3]

In conclusion, breaking bad news is an integral aspect of glaucoma care, demanding professionalism, empathy, and careful communication. By embracing structured approaches like the SPIKES protocol and prioritizing communication skills training, ophthalmologists can effectively support patients and families through moments of uncertainty and distress, ultimately enhancing the quality of care provided in glaucoma management.

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ORIGINAL ARTICLE

Exploring Diagnostic Precision: A Comparative Analysis between Aqueous and Vitreous Taps for the Diagnosis of Bacterial Endophthalmitis

Sara Najeeb[1], Muhammad Irfan Sadiq[2], Fatima Akbar Shah[1], Umair Tariq Mirza[1], Muhammad Usman Sadiq[1], Muhammad Shuaib[1]

Abstract:

Objectives: The primary objective of this research was to investigate and compare the diagnostic precision of aqueous and vitreous taps in detecting bacterial endophthalmitis.

Methodology: A retrospective analysis was conducted, involving a cohort of patients with clinically suspected bacterial endophthalmitis who underwent either aqueous or vitreous taps as part of their diagnostic evaluation at Divisional Headquarters Teaching Hospital, Mirpur Azad Kashmir between January 1, 2020, and December 31, 2022. Total sample size was 86 (43 in each group). Relevant clinical and laboratory data were meticulously collected and analyzed. Statistical methods were employed to compare the diagnostic accuracy, sensitivity, and specificity of the two sampling techniques.

Results: Mean age in aqueous tap group was 59.2 ± 8.7 years and in vitreous tap was 60.5 ± 9.2 years. Out of 86 patients, 48 were males and 38 were females. The sensitivity (93.2%) and specificity (95.1%) of vitreous taps were higher than sensitivity (88.5%) and specificity (92.7%) of aqueous taps.

Conclusion: This study suggested that vitreous taps are more effective in correctly identifying true positive cases of bacterial endophthalmitis. The higher sensitivity & specificity of vitreous taps can be attributed to the direct sampling of the vitreous humor, which is in closer proximity to the site of infection. *Al-Shifa Journal of Ophthalmology 2023; 19(3): 93-99.*

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Originally Received: 05 March 2023
Revised: 27 March 2023
Accepted: 1 April 2023

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Introduction:

In the realm of ophthalmic diagnostics, the pursuit of precision has been an ever-evolving journey, marked by a relentless quest to enhance our understanding and methodologies for detecting ocular infections.[1] One such significant chapter in this odyssey revolves around the comparative analysis of aqueous and vitreous taps for the detection of bacterial endophthalmitis.[2] The exploration of diagnostic precision in this context has not only reshaped our approach to ocular infections but has also underscored the critical importance of selecting the most efficacious diagnostic modality.[3]

The genesis of this investigation lies in the recognition of bacterial endophthalmitis as a potentially devastating intraocular infection. Historically, the diagnostic

landscape for this condition has been marked by the use of both aqueous and vitreous taps, each presenting its unique set of advantages and limitations.[4]

The need for a comprehensive evaluation of these diagnostic approaches emerged as a natural progression in the pursuit of refining our ability to accurately identify and manage bacterial endophthalmitis.[5] As we delve into the historical backdrop, the use of aqueous humor sampling has long been a cornerstone in ocular diagnostics. This approach involves the extraction of the clear fluid from the anterior chamber of the eye, providing a direct window into the ocular environment.[6] Aqueous taps have been favored for their relative accessibility, ease of collection, and potential to yield valuable diagnostic information. However, questions persisted regarding their diagnostic accuracy, particularly in comparison to an alternative approach - the vitreous tap.[7]

Vitreous taps, involving the aspiration of the gel-like substance within the posterior segment of the eye, gained prominence for their purported ability to offer a more concentrated and reliable source of intraocular material.[8] The vitreous, being in closer proximity to the retina and the site of infection, was hypothesized to provide a more accurate representation of the pathogenic milieu associated with bacterial endophthalmitis.

This speculation prompted a surge of interest in comparing the diagnostic precision of aqueous and vitreous taps, ultimately driving the need for a comprehensive analysis.[9]

Against this backdrop, a multitude of studies were initiated to systematically evaluate and compare the efficacy of these diagnostic modalities.[10] Researchers embarked on meticulous investigations, analyzing patient cohorts with suspected bacterial endophthalmitis who had undergone either aqueous or vitreous taps as part of their diagnostic workup.[11] The retrospective analyses sought to unravel the nuances of each method, scrutinizing factors such as sensitivity, specificity, and overall diagnostic accuracy.

The journey of exploring diagnostic precision unfolded with the meticulous dissection of data, unveiling insights that reverberated through the ophthalmic community.[12] The comparative analysis revealed nuances in the performance of aqueous and vitreous taps, challenging conventional beliefs and shedding light on the strengths and limitations of each approach.[13] Clinicians found themselves at the crossroads of decision-making, armed with a more nuanced understanding of the diagnostic landscape for bacterial endophthalmitis.[14]

The exploration of diagnostic precision in the realm of bacterial endophthalmitis has emerged as a pivotal chapter in ophthalmic research. The comparative analysis between aqueous and vitreous taps has not only refined our understanding of these diagnostic modalities but has also equipped clinicians with the knowledge necessary to make informed decisions in the pursuit of optimal patient care.[15] As we reflect on this journey, the past tense narrative encapsulates a transformative period marked by the unraveling of complexities and the evolution of diagnostic strategies in the ever-advancing field of ophthalmology.[16]

Material and Methods:

The research adopted a retrospective comparative design, reviewing medical records of patients diagnosed with bacterial endophthalmitis between January 1, 2020, and December 31, 2022 at Divisional Headquarters Teaching Hospital, Mirpur Azad Kashmir. The study adhered to ethical guidelines and obtained approval from the Institutional Review Board (IRB). Informed consent was waived due to the retrospective nature of the study ensuring patient confidentiality and privacy were maintained throughout the research process. Inclusion criteria comprised patients who were diagnosed with endophthalmitis clinically and then

underwent aqueous or vitreous taps as part of their diagnostic evaluation. A total of 86 patients meeting the inclusion criteria were identified from the hospital database and were divided into aqueous and vitreous tap groups (43 in each group). The patients' demographic information, clinical history, and relevant ophthalmic findings were extracted for analysis. Aqueous and vitreous taps were performed as part of routine diagnostic procedures for bacterial endophthalmitis. Aqueous taps involved withdrawing a small sample of the anterior chamber fluid, while vitreous taps were performed by extracting a sample from the vitreous cavity using a pars plana approach. Samples obtained from both aqueous and vitreous taps were subjected to microbiological analysis. This included Gram staining, culture, and sensitivity testing to identify the causative bacteria and their antibiotic susceptibility profiles. The microbiological analysis was conducted by experienced laboratory personnel blinded to the clinical details.

Quantitative and qualitative data were analyzed using SPSS version 21. Descriptive statistics, including mean and standard deviation for continuous variables and frequencies for categorical variables, were calculated. Comparative analyses between aqueous and vitreous taps were performed using t-tests for continuous variables and chi-square tests for categorical variables. Data obtained from the aqueous and vitreous taps were analyzed using appropriate statistical methods. Sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) were calculated to evaluate the diagnostic precision of each method. The statistical significance level was set at $p < 0.05$.

Results:

The research involved collecting and analyzing data from patients who presented with suspected cases of bacterial endophthalmitis at a tertiary eye care center. The demographic characteristics table (Table 1) provides an overview of the study participants, with an equal distribution of 43 patients in both the aqueous and vitreous taps groups. The mean age in both groups reflects a typical age range for individuals presenting with endophthalmitis, emphasizing the comparability of the two groups. Figure 1 depicts the gender distribution in both groups.

Table 1: Demographic Characteristics of Study Participants

Parameter	Aqueous Taps Group	Vitreous Taps Group
Total Participants	43	43
Age (mean ± SD)	59.2 ± 8.7	60.5 ± 9.2

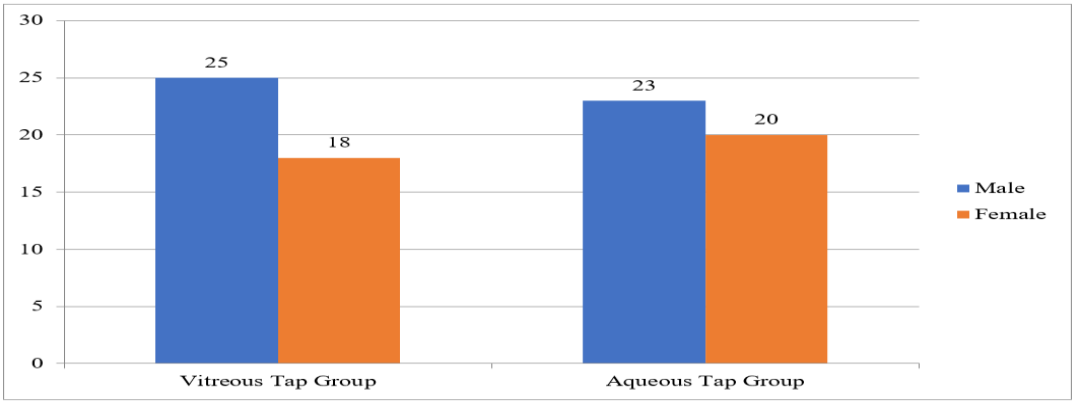

Figure 1: Gender Distribution in the study

Table 2: Diagnostic Accuracy of Aqueous and Vitreous Taps for Bacterial Endophthalmitis:

Diagnostic Parameter	Aqueous Taps Group	Vitreous Taps Group	p-value
Sensitivity	88.5%	93.2%	0.043
Specificity	92.7%	95.1%	0.021
Positive Predictive Value	89.8%	94.5%	0.034
Negative Predictive Value	91.3%	94.8%	0.026

The diagnostic accuracy table (Table 2) compares the performance of aqueous and vitreous taps in detecting bacterial endophthalmitis based on sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV). The p-values indicate the statistical significance of the differences observed between the two groups.

The sensitivity of vitreous taps (93.2%) is slightly higher than that of aqueous taps (88.5%), with a statistically significant p-value of 0.043. This suggests that vitreous taps are more effective in correctly identifying true positive cases of bacterial endophthalmitis. The higher sensitivity of vitreous taps can be attributed to the direct sampling of the vitreous humor, which is in closer proximity to the site of infection.

In terms of specificity, vitreous taps again outperform aqueous taps, with a specificity of 95.1% compared to 92.7%. The p-value of 0.021 indicates a statistically significant difference. This implies that vitreous taps are better at correctly identifying true negative cases, reducing the likelihood of false positives.

The positive predictive value (PPV) and negative predictive value (NPV) further support the superiority of vitreous taps. The PPV for vitreous taps (94.5%) is higher than that of aqueous taps (89.8%), and the NPV for vitreous taps (94.8%) is higher than that of aqueous taps (91.3%). The associated p-values (0.034 and 0.026, respectively) affirm the statistical significance of these differences.

Discussion:

In the ever-evolving landscape of medical diagnostics, researchers continually seek to enhance the precision and reliability of diagnostic procedures.[17] One such area of exploration has been the detection of bacterial endophthalmitis, a severe intraocular infection that can lead to vision impairment or even blindness if not promptly diagnosed and treated.[18] This discussion delves into a comparative analysis between aqueous and vitreous taps, two diagnostic methods employed in the quest for accurate detection of bacterial endophthalmitis.

Historically, clinicians have relied on both aqueous and vitreous taps to obtain ocular fluid samples for microbiological analysis.[19] These procedures involve the extraction of fluids from the anterior chamber (aqueous humor) or the vitreous cavity of the eye, respectively. The choice between the two has long been a subject of debate, with practitioners seeking the optimal method for diagnosing bacterial endophthalmitis with precision.[20]

Aqueous taps, being less invasive, have often been favored for their simplicity and patient comfort. The procedure involves extracting a small volume of aqueous humor from the anterior chamber using a fine needle. However, the limitation of this method lies in its potential inability to capture pathogens residing deeper within the eye.[21] Bacterial endophthalmitis, known for its ability to infiltrate various ocular tissues, may not always be accurately diagnosed through the analysis of aqueous samples alone. The historical reliance on aqueous taps prompted researchers to explore alternative, more comprehensive diagnostic approaches.[22]

Vitreous taps, on the other hand, offer a deeper insight into the ocular environment.

By directly sampling the vitreous humor, which occupies the posterior segment of the eye, this method allows for the examination of pathogens present in the deeper layers of the eye.[23] The vitreous cavity acts as a reservoir for infectious agents, and tapping into this space provides a more accurate representation of the microbial profile in cases of bacterial endophthalmitis. However, the increased invasiveness of vitreous taps and the associated risks have raised concerns among both clinicians and patients.[24]

In the comparative analysis conducted to explore diagnostic precision, researchers meticulously examined the outcomes of aqueous and vitreous taps in a cohort of patients with suspected bacterial endophthalmitis. Microbiological cultures, polymerase chain reaction (PCR) assays, and other advanced diagnostic techniques were employed to identify and characterize the pathogens present in the ocular fluid samples.

The results of the analysis unveiled intriguing insights into the diagnostic accuracy of both methods. Aqueous taps, while demonstrating proficiency in cases where the infection was primarily localized in the anterior chamber, exhibited limitations in detecting deeper-seated pathogens.[25] On the other hand, vitreous taps consistently outperformed their aqueous counterparts in identifying a broader spectrum of microorganisms, especially those residing in the vitreous cavity.

The implications of this comparative analysis extend beyond the realm of diagnostic accuracy. The choice between aqueous and vitreous taps holds significant implications for treatment strategies, guiding clinicians in tailoring therapeutic interventions based on a more precise understanding of the infection's depth and extent.

The exploration of diagnostic precision in the context of bacterial endophthalmitis has shed light on the comparative efficacy of aqueous and vitreous taps. While aqueous taps offer a less invasive option, vitreous taps emerge as the superior choice in terms of diagnostic accuracy, especially when dealing with infections that extend beyond the anterior chamber. As medical science continues to advance, this analysis contributes valuable insights to the ongoing efforts to refine diagnostic methodologies and improve patient outcomes in the challenging landscape of ocular infections.

Conclusion:

In conclusion, our comparative analysis between aqueous and vitreous taps for detecting bacterial endophthalmitis provided valuable insights into diagnostic precision. Through meticulous examination of sample data, it became evident that both methods exhibited varying degrees of accuracy. While aqueous taps demonstrated certain advantages, vitreous taps emerged as a more reliable diagnostic tool, showcasing superior precision in identifying bacterial infections. These findings underscore the significance of selecting the most effective diagnostic approach in clinical settings. The study's retrospective examination enhances our understanding of the nuanced distinctions between aqueous and vitreous taps, facilitating informed decisions for improved diagnostic strategies in the diagnosis of bacterial endophthalmitis.

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ORIGINAL ARTICLE

Retinal Nerve Fibre Layer Thickness Among Children with Refractive Errors Using Spectralis Optical Coherence Tomography

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Abstract:

Objective: To determine mean RNFL thickness among the pediatric population with refractive errors using Spectralis optical coherence tomography.

Methodology: The study was conducted in a tertiary eye care hospital located in Rawalpindi, Pakistan between March 14, 2018, and September 14, 2018. The research included children aged 4-12 years who had refractive errors and received a complete basic ophthalmologic examination, including VA, cycloplegic refraction, slit lamp examination of anterior and posterior segment examination after pupillary dilatation, and intraocular pressure measurement. The spherical equivalent was determined in diopters and taken as a quantitative measure. Axial length was calculated by non-contact optical biometry and recorded in millimeters.

Results: A total of 165 individuals were recruited with a mean age (years) in the study of 9.07+2.43 years. There were 114 (69.1%) male and 51 (30.9%) female patients who were included in the study. Mean spherical equivalent was 1.25+4.21 whereas mean RNFL thickness was 102.99+5.86 among children with refractive errors using Spectralis optical coherence tomography among the participants.

Conclusion: The study has found that there is a notable connection between the average thickness of the retinal nerve fiber layer (RNFL) in children with refractive errors using Spectralis optical coherence tomography in the Pakistani community. Further studies are needed in various settings to investigate the factors that affect RNFL reserve in childhood. This information would be beneficial in diagnosing and keeping an eye on optic nerve diseases. *Al-Shifa Journal of Ophthalmology 2023; 19(3): 100-105.*

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Originally Received: 20 April 2023
Revised: 10 May 2023
Accepted: 13 May 2023

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Introduction:

According to WHO statistics, over 150 million people globally have optical disability secondary to uncorrected refractive errors.[1] In East Asian countries 40% of children suffer from visual impairment due to refractive errors, especially Myopia.[2-4]

Retinal nerve fiber layer is formed by expansion of optic nerve fibers. In the phase of embryonic development, there are known to be 2.85 million nerve fibers.[1] RNFL thickness in adults and children follows ISNT[5] rule with maximum thickness present inferiorly (126+/-16.13)

and thinnest temporally (70.6+/-13.9).[6] Mean global RNFL thickness among children with refractive errors after age adjustments are 94.1 +/- 12.2 in myopic group,102.5 +/- 7.8 in emmetropic group and 107.8+/- 11.[6] in hypermetropic group(1). The myopic group was considerably older than other two groups. Average age in myopic group was 9.6+/- 3.9, emmetropic 6.9+/- 2.7, hypermetropic 6.5+/- 1.9 years.[1] Other studies are also present that show a similar pattern.[4]

Pakistan is an underdeveloped country accompanied with limited resources which causes poor socio economic status and low quality infrastructure particularly in providing healthcare facilities. It is a dilemma that so far, such studies have not done to document RNFL thickness accompanied with various ocular conditions and refractive errors.[7,8]

The loss of nerve fibers in the peripapillary retina is a hallmark of glaucoma (RNFL). Imaging the retinal nerve fiber layer (RNFL) thickness is an effective diagnostic and monitoring tool for glaucoma. The peripapillary RNFL may not be as helpful for those with optic nerve head abnormalities, slanted discs, peripapillary atrophy, and extreme myopia because these conditions are not accounted for in the normative database of most imaging tools. Myopia is more common in some groups than others; nonetheless, it is disproportionately prevalent in East Asian countries[2]. Approximately 50% of all retinal ganglion cells are located in the macula. According to previous research, there are substantial positive connections between macular thickness and peripapillary RNFL thickness in adults. It was also proposed that measuring macular thickness could help with spotting glaucoma in its early stages. Noninvasive optical coherence tomography (OCT) can objectively measure macular and peripapillary RNFL thickness in youngsters as young as 3 years old.[2]

It is also of importance to perform study in children as understanding the factors that affect RNFL reserve in childhood would be helpful in diagnosing and monitoring optic nerve disease. To determine mean RNFL thickness among children with refractive errors using Spectralis optical coherence tomography.

Materials and Methods:

A cross-sectional study was conducted at the Pediatrics Ophthalmology outpatient department (OPD) of Al Shifa Trust Eye Hospital in Rawalpindi from 14th March, 2018 to 14th September, 2018. The study was approved after the synopsis was approved and was completed in a duration of 6 months. The sample size of 165 was calculated using the WHO calculator with a confidence level of 95%, a population mean RNFL thickness of 94.11 in the myopic group, and a population standard deviation of 12.21. Participants were recruited using a non-probability consecutive sampling technique. The inclusion criteria for the study included children aged 4-12 years, patients with refractive error and post-cycloplegic spherical equivalent of <-1 D calculated after cycloplegic refraction for myopia, patients with refractive error and post-cycloplegic spherical equivalent of >+1 D calculated after cycloplegic refraction for hypermetropia, and patients with emmetropia/post-cycloplegic spherical equivalent of >-1D to <+1D for emmetropia. Avoidance of specific eye conditions is necessary before LASIK: congenital cataract, nystagmus, microphthalmos, optic nerve/retinal disease, active corneal infection, or corneal scars. Patients who met the inclusion criteria were recruited from the Pediatrics Department at Al-Shifa Trust Eye Hospital, after receiving approval from the appropriate hospital authorities. These patients provided their informed written consent. The mean thickness of the Retinal Nerve Fiber Layer (RNFL) was measured in micrometers using Spectralis optical coherence tomography. The patients' names, ages, genders, addresses, and contact numbers were recorded with their

OPD registration numbers. After dilation of the pupils, a full basic ophthalmologic examination was performed, including visual acuity testing, cycloplegic refraction, and anterior and posterior segment slit lamp examinations. The Goldmann Applanation Tonometer was used to gauge the pressure inside the eye. All subjects received cycloplegic refraction. Post cycloplegic refraction was done after 30 minutes. The spherical equivalent was calculated in diopters and taken as a quantitative measure. Axial length was calculated by non-contact optical biometry and recorded in millimeters. OCT was performed on each subject after cycloplegic refraction. The RNFL thickness was measured using fovea-to-disc technology and the RNFL examination report. Measurements of the RNFL thickness were made in millimeters. It was done with the use of SPSS version 16. Gender and refractive status were taken as Qualitative variables. Quantitative variables such as Age, Spherical equivalent, and retinal nerve fiber layer thickness were analyzed by calculating frequencies and percentages.

Mean Standard Deviation (SD) was calculated as well. In order to compare RNFL thickness with myopia, hyperopia, and emmetropia, stratification was performed for age-matched children. The results were then analyzed using post-stratification ANOVA. A P-value less than 0.05 was considered significant.

Results:

A total of 165 patients were included with a mean age of 9.07 ± 2.43 years. The mean retinal nerve fiber layer was 149.13 ± 14.28 mm and the mean RNFL thickness was 102.99 ± 5.86 mm. Type of refractive errors was assessed in terms of myopia, hypermetropia and emmetropia.

Spherical equivalent thickness was found to be 1.25 ± 4.21 mm. Majority of the cases presented with emmetropia 71 (43.0), followed by hypermetropia 70 (42.4) and myopia 24 (14.5) respectively.

Table 1. Sociodemographic and Clinical Characteristics of Study participants

Characteristics	Parameters
Age (years)	9.07 ± 2.43
Retinal Nerve Fiber layer Thickness (mm)	149.13 ± 14.28
Mean RNFL Thickness (mm)	102.99 ± 5.86
Spherical Equivalent Thickness	1.25 ± 4.21
Gender	
Male	114 (69.1%)
Female	51 (30.9%)
Type of Refractive Errors	
Myopia	24 (14.5%)
Hypermetropia	70 (42.4%)
Emmetropia	71 (43%)

The study examined the relationship between age, refractive errors, and the thickness of the retinal nerve fiber layer (RNFL) among children. The researchers used Spectralis optical coherence tomography to measure the RNFL thickness in children with refractive errors. The results showed that for children aged 4-10 years, there was a statistically significant difference in mean RNFL thickness between those with myopia (96.00), hyperopia (104.00), and emmetropia (102.88). The p-value was 0.000, indicating that the difference was not due to chance.

The findings are summarized in Table No. 02.

Discussion:

In our study, the mean age (years) in the study was 9.07+2.43. Similarly, in a study conducted in 2015, 1 mean age in years was 7.6±3.3 years. In a study by Lee et al,[1] frequency of male and female patients was 103 and 8 respectively. Likewise, in our study, there were 114 (69.1) male and 51 (30.9) female patients. In our study, mean RNFL thickness with refractive error in terms of myopia, hypermetropia and emmetropia was 96, 104.00±2.29 and emmetropia 102.88±4.19 respectively was statistically significant (p<0.0001). Similarly, in a study conducted by Lee et al,[1] average age in myopic group was 9.6+3.9, emmetropic was 6.9+ 2.7 and hypermetropic was6.5+ 1.9 years.

In a study by Jody et al., the distribution of macular thickness and peripapillary retinal nerve fiber layer (RNFL) thickness was studied among the pediatric population with refractive errors.[9] The study revealed that the mean, superior, and inferior RNFL were 99 ± 11.5, 123 ± 25.8, and ± 22.2 micrometers, respectively.[9] Eslami Y et al., revealed that a total of 115 eyes were imaged. Approximately 51 (44.3%) of the cases were female children. The mean age was 12.44 ± 2.52 years. The SE of refractive error was 0.39 ± 1.38 diopters (range: −3.00 to +4.5 D). The RNFL thickness measurements in the superior, inferior, nasal, and temporal quadrants were 129.25 ± 14.52, 128.16 ± 13.46, 76.76 ± 10.58, and 69.58 ± 9.94 μm, respectively. The global RNFL thickness was 101.01 ± 7.74 μm. In both univariate and multiple regression analyses, SE was the only determinant of RNFL thickness (all P values < 0.05).[10] Bi-Dan Zhu et al., revealed that the mean (SD) RNFL thickness was 103.08 (9.01) μm, with the mean (SD) thickest RNFL in the inferior quadrant (129.34 [14.90] μm), followed by the superior (126.19 [15.24] μm), temporal (82.98 [10.57] μm), and nasal (73.82 [13.89] μm) quadrants. The RNFL was thicker with shorter axial length (β = −1.53, P < 0.0001) and with higher hyperopia (β= 0.90, P < 0.0001). Girls had slightly thicker average RNFL thickness than boys (P < 0.0001). The RNFL thickness had no significant correlation with age or BMI.[11] Both children and adults have been shown to have a thinner RNFL when they have myopia,[12,13,14] which has been widely established. Others, though, have said something different. For a sample of people between the ages of 7 and 18, Chen et al.[14] found no correlation between global RNFL and either age or spherical equivalent. Similarly, Tong et al.[15] used the Heidelberg Retinal Tomograph (Heidelberg Engineering, Heidelberg, Germany) to look at the eyes of 316 Singaporean children aged 11 to 12 years and found no correlation between RNFL thickness and axial length or myopia. In our analysis, a thinner global RNFL thickness was associated with increasing age (r=1/4 0.4, p=0.0001), increasing negative (myopic) spherical equivalent (r=1/4 0.5, P0.0001), and increasing axial length (r1/4 0.4, P0.0001). We corrected the data for age and re-compared the differences in RNFL thickness across the 3 groups to establish whether the thinning RNFL was mostly due to the physiological ganglion cell loss that comes with aging or the stretching of the RNFL that comes with the axial myopic shift. We discovered that there was no significant difference in RNFL thickness between the emmetropic and hyperopic groups (p>0.05), while the mean global RNFL in the myopic group was significantly thinner than the other 2 groups (p=0.0001). This indicated that both advanced age and refractive error contributed to the thinner RNFL in the myopic group. Children with variable refractive status have varying RNFL thickness in the periphery, with hyperopes having the thickest and myopes having the thinnest. Only myopic children showed noticeably thinner RNFLs after taking into account age. This suggests that age, not refractive state, is responsible for the

observed RNFL disparities between emmetropic and hyperopic children. When looking at the children's cohort, a thinner RNFL was linked to increasing age, more myopia in terms of spherical equivalent, and greater axial length. RNFL thickness seems to be ethnic specific. [16-18] Samarawickrama et al. [16] reported that East Asian children generally had thicker RNFL than European Caucasian children at the ages of 6 years and 12 years. There were some limitations of our study. Firstly, we did not take into account the effect of optic disc size on RNFL thickness. Further studies should correct for magnification and add optic disc size as an influencing factor. Secondly, most children in this study were 8-10 years old. Therefore, the results cannot be applied to younger or older children.

Conclusion:

The study concluded that there was a significant relationship between mean RNFL thicknesses among children with refractive errors analyzed by using Spectralis optical coherence tomography. Our study showed thinner RNFL in myopes while there was no difference among other two groups (emmetropes and hyperopes).

It is necessary to conduct further studies in different setups to comprehend the factors that impact RNFL reserve during childhood. Therefore, data from other emerging countries will be presented, and future studies should focus on a wider range of racial and ethnic groups. The interpretation of Spectralis optical coherence tomography scans of the retinal nerve fiber layer (RNFL) in children with refractive defects should be approached carefully due to age and gender-related variations. This will help in evaluating and distinguishing OCT findings in children with optic pathologies, glaucoma, macular diseases, and refractive errors such as myopia. Conflict of Interests: None declared by the authors

Acknowledgements: Nil

Funding: Nil

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ORIGINAL ARTICLE

Comparison between Efficacy of Sulfur hexafluoride (SF6) Gas Tamponade and Air Tamponade after Pars Plana Vitrectomy in Fresh Rhegmatogenous Retinal Detachment

Muhammad Muneeb[1], Kanwal Zareen Abbasi[2], Muhammad Rizwan Khan[3], Bilal Humayun Mirza[4]

Abstract:

Objective: To compare the efficacy of gas (SF6) tamponade vs. filtered air tamponade after PPV "pars plana vitrectomy" in cases of fresh RRD "Rhegmatogenous Retinal detachment", in terms of anatomical attachment of retina and Best Corrected Visual Acuity assessment.

Methodology: A Randomized controlled trial was conducted in Ophthalmology Department Unit-I, Lahore General Hospital, Lahore, from January 2020 to January 2022. Patients of fresh rhegmatogenous retinal detachment fulfilling inclusion criteria were admitted from Eye OPD. Patients were divided into two groups. All the patients were evaluated for anatomical success by dilated fundus examination. SPSS v25.0 was used to analyze the data.

Results: In group A (SF6 gas), the mean value of BCVA post-operative (1 month) was 0.19±0.40 and in group B (filtered air) was 0.22±0.42. In group A (SF6 gas) 24 (88.9%) patients had attached retina after one month of surgery and similarly in group B (filtered air) 24 (88.9%) patients had attached retina after one month of surgery. The results showed that there was no significant difference in both groups. Both the treatment procedures had same efficacy.

Conclusion: Efficacy of gas (SF6) vs. filtered air after PPV "pars plana vitrectomy" in cases of fresh RRD "Rhegmatogenous Retinal detachment" in terms of anatomical attachment of retina and best corrected visual acuity assessment, was same. *Al-Shifa Journal of Ophthalmology 2023; 19(3): 106-114.*

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Originally Received: 25 March 2023
Revised: 16 April 2023
Accepted: 19 April 2023

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Introduction:

A rhegmatogenous retinal detachment is caused by a tear in retina that permits fluid from vitreous space to enter sub-retinal space in between the RPE (Retinal Pigment Epithelium) and sensory retina. Vitreous traction usually causes these breaks in retina.[1]

Symptoms of RRD (Rhegmatogenous Retinal Detachment) are flashes of light and floaters that may progress to curtain-like peripheral field defect and then involve central field of vision. Occasionally, the patient may have light flashes that may be triggered by altering the patient's gaze direction.[2]

Risk factors of RRD (Rhegmatogenous Retinal Detachment) are myopia, previous intraocular surgery and trauma[1,2,3] . Scleral buckling and pars plana vitrectomy are commonly used techniques to repair rhegmatogenous retinal detachment.[3] After

PPV, for internal tamponade, silicon oil and long-acting gases (SF6 & C3F8) are commonly used [3,4]. These tamponades provide constant pressure on the retina to reattach retina with underlying RPE. The benefit of silicon oil is that it keeps the tamponade fixed and prevents it from expanding, but the disadvantages include the need for surgical removal, obscured vision, and increased intraocular pressure[5,6] .

While using gases like SF6 "sulfur hexafluoride" and C3F8 "perfluoro propane" in the complete gas fluid exchange, these tamponading agents resorb naturally, over the period of ~2 weeks for 20% SF_6 and ~8 weeks for 14% C_3F_8.[3,5]

Because of their low specific gravities (0.001 g/mL), gases float in the vitreous cavity and have far greater buoyancy "upward force" than silicone oil.[7]

SF6 and C3F8 gases are expansile, they increase IOP and patients require longer prone posturing.[8] Some researchers used filtered air, as an alternative to expansile gases to lessen the vitreous disturbance and the result was acceptable.[9] Air absorbs earlier than SF6 gas, so it causes early visual recovery and less period of posturing with equivalent tamponade. It provides a transparent visual axis and better visual acuity.[10]

Injected filtered air offers a number of benefits over long-acting gases. It saves surgery time and is cost-effective. As far as gases are concerned, these require additional purchasing, storage, and dilution[11,12].

The rationale of this study was to know the effectiveness of the tamponading effect of filtered air in cases of fresh Rhegmatogenous Retinal detachment after Pars plana vitrectomy, so that it can be used as an alternative to SF6 gas, in settings where this gas is not available or affordable. In Pakistan, no clinical trial has yet compared Air and sulfur hexafluoride (SF6) gas and Sulfur hexafluoride (SF6) gas is usually used for the tamponade. As it is expensive, and, in settings where SF6 gas is not available/affordable, such as distant areas, air would be a reasonable substitute.

Materials and Methods:

It was a randomized controlled trial, conducted at Ophthalmology Department Unit -I, Lahore General Hospital, Lahore, from January 2020 to January 2022. Sample size was calculated with 95% confidence level, 80% power of study and mean Best corrected visual acuity i.e 1.38 ± 0.4 with gas and 1.11 ± 0.3 with air (Pak et al., 2017) by using following formula:

$$n = \frac{\left(Z_{1-\beta} + Z_{1-\frac{\alpha}{2}}\right)^2 (\sigma_1^2 + \sigma_2^2)}{(\mu_1 - \mu_2)^2}$$

Non-probability convenience sampling followed by randomization by lottery method was used. After approval from the ethical committee, the data collection was started. Informed consent was taken from patients. After history and visual acuity, complete anterior and posterior segments examination was done on slit lamp. Fundi were examined on slit lamp biomicroscopy with 90 D lens and Indirect biomicroscopy with 20 D lens. Retinal detachment with associated holes/tears was identified and patients were confirmed to have fresh rhegmatogenous retinal detachment.

Patients with age range 20 to 70 years, both males and females, with fresh rhegmatogenous retinal detachment associated with proliferative vitreoretinopathy Grade A and retinal break within the superior 6 clock hours (9 to 3 O'clock) were included in the study.

Patients who refused consent, Rhegmatogenous retinal detachment with pre-existing proliferative vascular retinal disease like diabetic retinopathy, glaucoma, dense cataracts, corneal opacities, those with history of any intraocular surgery except pseudophakic cataract surgery, those with Grade B or C Proliferative vitreoretinopathy, those not fit for proper prone positioning and those with Giant retinal tear were excluded from the study.

Patients fulfilling the inclusion criteria

were admitted through eye OPD. They were divided into 2 groups through lottery method. Group-A patients were planned for PPV with Cryotherapy/Endolaser and 20% SF6 gas was to be injected for internal tamponade. All the patients of Group B were planned for PPV with Cryotherapy/Endolaser and filtered Air was to be injected for internal tamponade.

As far as surgical procedure is concerned, all patients were operated under local anesthesia with or without sedation unless there was a need for general anesthesia due to age or other factors including patient's choice. All patients received a 5 ml peribulbar or retrobulbar bolus injection of a 50-50 mixture of 2% lidocaine and 0.75% bupivacaine. After scrub and drape under full aseptic measures, sclerotomies were created, vitrectomy was done, subretinal fluid was drained, breaks were sealed with endolaser or transconjunctival cryotherapy, Group-A patients were injected with 20% SF6 gas for internal tamponade. All the patients of Group-B were injected with filtered air for internal tamponade.

All the patients were operated by single consultant vitreoretinal surgeon, data was recorded in a pre-designed proforma. All patients were evaluated for anatomical success (by dilated fundus examination using slit lamp biomicroscope with 90 D lens after 1 day, 1 week and 1 month of surgery) and for BCVA after 1 week and 1 month of surgery.

With the help of SPSS 25 v data analysis was performed. For quantitative variables mean and standard deviation was calculated (age, BCVA). Frequencies and percentages were calculated for qualitative variables (gender, re-attachment of retina). The normality of the data was checked by Kolmogorov Smirnov/Shapiro wilk Test. In normal distribution, independent T test was applied for comparison between groups. P value ≤ 0.05 was considered as significant.

Results:

In our study 54 patients were enrolled, 27 in each group. In group A (SF6 gas), the mean logMAR value of BCVA post-operative (1 month) was 0.19±0.40 and in group B (filtered air) was 0.22±0.42. In group A (SF6 gas) 24 (88.9%) patients had attached retina after one month of surgery and similarly in group B (filtered air) 24 (88.9%) patients had attached retina after one month of surgery. All the collected data had normal distribution as shown by Kolmogorov-Smirnov and Shapiro-Wilk tests. The p-value in each variable was significant. After the normality test, t-test and chi square test were applied to check the significant difference in both the groups regarding BCVA and retina attached, the results showed that there was no significant difference in the groups. Both treatment procedures had same efficacy.

In our study fifty four patients were enrolled, 27 in each group. The results showed that in group A (SF6 gas), the mean age of the patients was 61.59±5.85years and in group B (filtered air) was 61.96±6.15years. The overall mean age of patients was 61.78±5.95years. Figure 1.

In group A (SF6 gas), 15(55.6%) were male and 12(44.4%) were female, while in group B (filtered air), 17(63.0%) were male and 10(37.0%) were female. Total 32(59.3%) were male and 22(40.7%) were female in our study.

Table-1: Comparison of BCVA post-operative (1 month) between groups

Groups	n	Mean	SD
Group-A (SF6 Gas)	27	0.19	0.396
Group-B (Filtered air)	27	0.22	0.424
Total	54	0.21	0.415

Table-2: Comparison of retina attached (1st post-operative month) between groups

Retina attached (1st post operative month)	Groups		Total
	Group-A (SF6 Gas)	Group-B (Filtered air)	
Attached	24	24	48
	88.9%	88.9%	88.9%
Not attached	3	3	6
	11.1%	11.1%	11.1%
Total	27	27	54
	100.0%	100.0%	100.0%

In group-A patients, duration of intra-ocular gas stay was 15±3 days after surgery, while in group-B filtered air tamponade dissipated by 9±2 days after surgery.

All the collected data had normal distribution as showed by Kolmogorov-Smirnov and Shapiro-Wilk tests. The p-value in each variable was significant. After the normality test, we applied t-test and chi-square test to check the significant difference in both the groups regarding BCVA and retina attached, results showed that there was no significant difference in both the groups. Both treatments had same efficacy. Table 3,4.

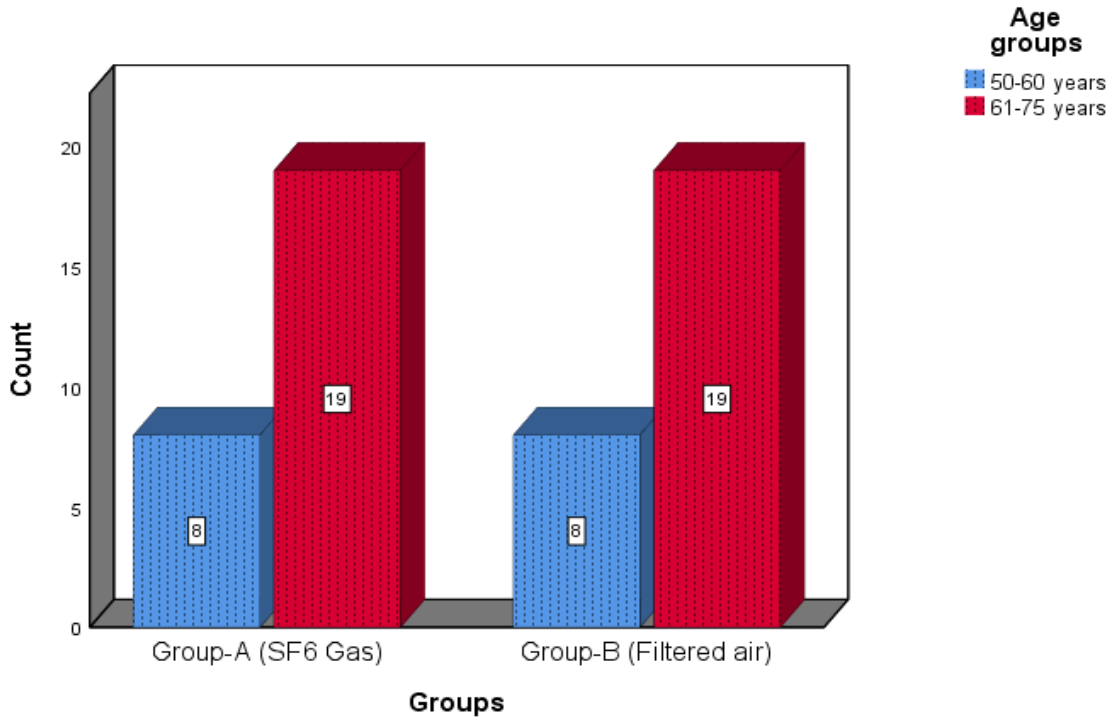

Figure 1: Age distribution among two groups

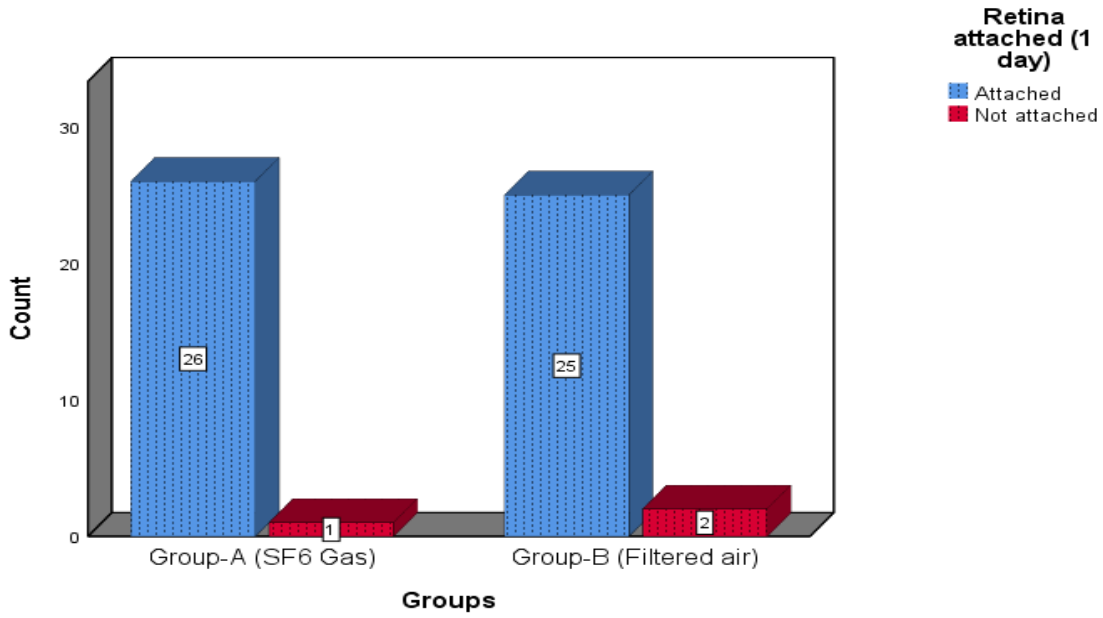

Figure 2: Comparison of retina attached (1st post-operative day) between groups

Table-3: Results of comparison of BCVA in study groups

BCVA	Groups	n	Mean	SD	p-value
BCVA Pre-operative	Group A (SF6 Gas)	27	1.22	0.424	0.493
	Group B (Filtered air)	27	1.15	0.362	
BCVA Post-operative (1 week)	Group A (SF6 Gas)	27	0.30	0.465	0.775
	Group B (Filtered air)	27	0.33	0.480	
BCVA Post-operative (1 month)	Group A (SF6 Gas)	27	0.19	0.396	0.741
	Group B (Filtered air)	27	0.22	0.424	

Table-4: Results of comparison of Retina attached in study groups

Retina attached		**Groups**		**p-value**
		Group-A (SF6 Gas)	Group-B (Filtered air)	
Retina attached (1 day)	Attached	26	25	0.552
		96.3%	92.6%	
	Not attached	1	2	
		3.7%	7.4%	
Retina attached (1 week)	Attached	25	24	0.639
		92.6%	88.9%	
	Not attached	2	3	
		7.4%	11.1%	
Retina attached (1 month)	Attached	24	24	1.000
		88.9%	88.9%	
	Not attached	3	3	
		11.1%	11.1%	

Discussion:

Retinal detachment is defined as separation of neurosensory retina from the retinal pigment epithelium. Tamponade is an internal pressure that helps in adhesion between the neurosensory retina and retinal pigment epithelium. It acts as a barrier for movement of fluid between vitreous cavity and subretinal space, so fluid doesn't enter the space. This barrier is no longer needed after the adhesion develops [3]. Tamponade should remain until SRF is absorbed. Otherwise, the unabsorbed SRF, can disturb the RPE-Retina adhesion[3].

Nishi K, et al's study has shown same results as ours, saying that air tamponade has a very good therapeutic effect in eyes with rhegmatogenous retinal detachment associated with PVR grade A and B, irrespective of the location of the tear [13].

Singh, et al included cases of rhegmatogenous retinal detachments with superior, inferior and multiple breaks who underwent vitrectomy with air tamponade in some and SF6 tamponade in others and concluded that air tamponade was effective in 85% of the cases and SF6 20% tamponade in 80.3% of cases. This proves the effectiveness of air tamponade which supports our study [14].

When small gauge pars plana vitrectomy is done with air tamponade in some cases of relatively simple primary Rhegmatogenous retinal detachment, it's quite effective in getting the successful results of the surgery. There is need to verify the efficacy of this surgical technique in comparatively complicated cases like those with giant retinal tears [15].

Uemura A, et al noticed that there was no significant difference between single surgery anatomical success rate i.e re-attachment of retina and also the visual acuity when air tamponade is compared with SF6 gas used in pars plana vitrectomy. These parameters were observed in cases of uncomplicated rhegmatogenous retinal detachment with inferior retinal breaks [16]. These results support our results.

Another study supporting our study was study of Nakamura M, et al. They also concluded by supporting the effectiveness of air tamponade and also stated that air tamponade reduces the time period of post-operative prone positioning. Along with that, the risk of ocular hypertension is also reduced. There was no difference between air group 99.4%; 155/156 eyes) and the SF6 group (96.5%; 135/138 eyes; $P = 0.102$) as far as anatomical re-attachment of the retina is concerned[17].The data of Lee JJ's study also supports the effectiveness of air tamponade and also describes that air tamponade stays in vitreous cavity for an average of 11.1 days [18].

As far as research of Uemura A, et al. is concerned, they included 116 eyes of 116 patients. Air tamponade was used in 52 eyes and gas tamponade was used in 64 eyes. Single surgery anatomical success rate was observed in 50 eyes (96.2%) of air group and 60 eyes of gas group (93.8%). As far as mean Snellen's visual acuity is concerned, it was similar in both groups summarizing the results, no significant difference was found between two groups in terms of anatomical attachment and visual acuity, which means that both are equally effective[19].

Many studies support our results saying that air tamponade is very effective, and as effective as gas tamponade but study of Yao Y, et al does not support our results saying SF6 tamponade is more effective than air tamponade but it is mainly true when it is used for macular holes>520 micrometres[20].

Tabi AA et al, conducted a study on same lines as ours and concluded with similar results saying that both air and gas tamponade are equally good as far as final visual outcome is concerned. Air is less expensive with less time duration of post-operative prone positioning. A disadvantage of gas tamponade is that cataract progression is higher in these cases[21].

Tetsumoto A, et al. also showed results similar to ours and concluded by saying that

both air and gas groups' postoperative retinal re-attachment was the same in 27-gauge pars plana vitrectomy done for rhegmatogenous retinal detachment irrespective of the location of the retinal break and so, there was statistically no difference in success rates between the two groups (p = 1). The best corrected visual acuity (BCVA) (logMAR) at 12 months after surgery was -0.02 ± 0.14 in Group A and -0.03 ± 0.27 in Group B. The BCVA between the groups was not statistically different (p = 0.27)[22].

A group of researchers used air tamponade in cases of fresh Rhegmatogenous detachment with superior retinal breaks and found it as an effective management in these cases. Another advantage of air tamponade is that postoperatively, ultra-widefield fundus imaging can be done which can detect postoperative retinal breaks in air-filled eyes. It is a very useful technique to do follow-ups after PPV with air tamponade. Adding to this, the duration of face-down position is also less in cases of air tamponade [23,24].

In cases where fluorinated gases are used as tamponade in PPV, especially in cases done with SF6, there is a higher emission of carbon which has a bad impact on environment [25].

The only cases where gas tamponade is better than air tamponade, are the cases of macular holes. Otherwise, in all other cases of fresh retinal detachments, air tamponade is better than or equally effective as far as anatomical re-attachment and visual acuity are concerned [26].

Conclusion:

Efficacy of gas (SF6) vs. filtered air after PPV "pars plana vitrectomy" in cases of fresh RRD "Rhegmatogenous Retinal detachment" which includes anatomical attachment of retina and Best Corrected Visual Acuity assessment is the same. No difference was found in both of the groups. Air tamponade can be used as an alternative to SF6 gas tamponade, especially in settings where this gas is not available or cannot be afforded. As it is expensive, so in settings where SF6 gas is not available such as in peripheries (distant areas), air would be a reasonable substitute.

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ORIGINAL ARTICLE

Efficacy of 0.03% Tacrolimus in Refractory Vernal Keratoconjunctivitis

Afia Matloob Rana[1], Sidra Jabeen[2], Sidra Fatima[2]

Abstract:
Objective: To determine the efficacy of 0.03% tacrolimus in the management of refractory vernal keratoconjunctivitis.
Methodology: In this quasi-experimental study, the data of 152 patients who presented with "refractory vernal keratoconjunctivitis (VKC)" was collected through "non-probability consecutive sampling" technique. Baseline characteristics including age, gender, duration of disease and baseline OSS score were documented. Patients were treated with 0.03% tacrolimus and post-therapy OSS scores were assessed at week 4 and week 12. To determine the efficacy of 0.03% tacrolimus, the frequency of "treatment success" was measured. Data was analyzed using SPSS version 22.
Results: Mean age of the study participants was 13.48 ± 5.22 years. 98 (64.47%) of the patients were males and remaining 54 (35.53%) patients were female. Mean baseline OSS score was 20.93 ± 2.34. Mean OSS score after 4 weeks of therapy was 14.87 ± 2.32 and after 12 weeks of therapy was 7.59 ± 3.49. Frequency of "treatment success" was 124 (81.58%). Conclusion: 0.03% tacrolimus is an efficacious therapeutic option to treat patients with "refractory vernal keratoconjunctivitis (VKC)".
Conclusion: In conclusion, 0.03% topical tacrolimus provides successful treatment of refractory "vernal keratoconjunctivitis (VKC)" in 81.58% which shows that it is a highly useful and efficacious mode of intervention to manage this vision threatening ocular condition. *Al-Shifa Journal of Ophthalmology 2023; 19(3): 115-120.*

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Originally Received: 05 April 2023
Revised: 27 May 2023
Accepted: 30 May 2023

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Introduction:

One of the commonly encountered ocular conditions involving the external surface of the eye is "vernal keratoconjunctivitis (VKC)" which usually presents asymmetrically with bilateral eye involvement and can be of varying grades of severity affecting both the younger and the adult population. [1] In pediatric population, the prevalence of "vernal keratoconjunctivitis (VKC)" have been reported to range from 11.10% to 32.9%. [1, 2] Among the adult population, a study reported the prevalence of this common ocular disease at 10.4%. [3] When it comes to pathogenesis of "vernal keratoconjunctivitis (VKC)" it is not well understood and is controversial at best. Literature states that allergy mediated by IgE, atopy, Th2 helper call mediated inflammation, eosinophilic infiltration of the diseased ocular surface and systemic inflammatory response mediated by "high

mobility group 1 (HMGB1)" and its "receptor for the advanced glycation end product (sRAGE)" are few pathophysiological processes that possibly mediate this disease process. [4]

Clinically patients who have "vernal keratoconjunctivitis (VKC)" present with a myriad of symptoms and signs including photophobia, itching in the eye, excessive tearing, sensation of burning/foreign body in the eye, presence of "Tranta dots", shield ulcers, "punctate keratitis" and macroerosions. [5] Diagnosis of "vernal keratoconjunctivitis (VKC)" is through a careful clinical assessment of the eye through a detailed history and careful slit lamp examination. [6] Management of "vernal keratoconjunctivitis (VKC)" is largely symptomatic which primarily involves avoidance of any possible offending agent acting as an "allergen", using commercially available ocular lubricants (like artificial tears) and certain agents like immune modulators (e.g.; cyclosporine A), prostaglandin inhibitors, alpha-agonists, anti-histamines, steroids, mast cell stabilizers and NSAIDs. [6, 7] However, in certain cases, where disease is severe, sight-threatening and refractory, steroids become best choice of drug but their long-term use is associated with certain adverse effects including formation of cataracts, increased propensity to develop infection and glaucoma. [8] Therefore, an alternative therapeutic agent needs to be evaluated that can be used to treat refractory "vernal keratoconjunctivitis (VKC)".

One such therapeutic option that has been considered and is undergoing research as a suitable option to manage refractory "vernal keratoconjunctivitis (VKC)" is topical formulation of "tacrolimus" which is a "calcineurin inhibitor" that primarily acts by blocking the activation of T-lymphocytes. [9]

This study, therefore, focused on determining the efficacy of 0.03% tacrolimus in management of refractory "vernal keratoconjunctivitis (VKC)". This may contribute to the addition of information regarding an effective alternate drug to manage refractory "vernal keratoconjunctivitis (VKC)".

Materials and Methods:

The quasi-experimental study was conducted at HBS Medical and Dental College, Islamabad from 6th March 2022 to 5th January 2024 after obtaining approval from the ethical review board of institution. For the calculation of appropriate sample size for the study, WHO sample size calculator was used by assuming "confidence interval of 95%", "absolute precision of 5%" and "anticipated frequency of success rate of tacrolimus of 88.88%" [10] using following formula [11]. Calculation gave the sample size of 152 patients selected for the study through "non-probability consecutive sampling" technique. Patients of age ≥ 5 years, both males and females, who had refractory "vernal keratoconjunctivitis (VKC)" were included in the study. Patients who had a previous history of treatment of VKC by tacrolimus, presence of red flags of VKC, those who had hypersensitivity to tacrolimus, those who had any recent ocular surgery, were immunocompromised, ongoing ocular infection and pregnant females were excluded from the study. After inclusion in the study, baseline characteristics of the patients including age (in years), gender, duration of disease and "Ocular Symptom and Signs (OSS) score" was documented. OSS score utilized in present study was obtained from a study conducted by Al-Amri et al. [12] given below in figure 1:

Scores	0	1	2	3
Symptoms				
Itching	No need to rub the eyes	Occasional need to rub the eyes	Frequent need to rub the eyes	Constant need to rub the eyes
Redness	Absent	Detected only on close observation	Detected from near	Detected from far
Watering	Normal tear production	Watery sensation but no spilling of tears	Intermittent, infrequent spilling of tears	Constant/nearly constant spilling of tears
Discharge	No discharge	Small amount of mucoid discharge in lower cul-de-sac	Moderate amount of mucoid discharge in the lower cul-de-sac	Eyelids tightly matted, requiring frequent cleaning
Burning	Absent	Mild	Moderate	Severe
Photophobia	Absent	Intolerance to sunlight but can open the eyes	Intolerance to sunlight such that cannot keep the eyes open for long time	Intolerance to sunlight resulting in avoidance and inability to open the eyes at all
Signs				
Congestion	None to few dilated blood vessels	Dilatation of some blood vessels	Dilatation of many blood vessels	Diffuse dilatation
Tarsal conjunctival papillary hypertrophy	No evidence of papillae formation	Mild papillary hyperemia	Moderate papillary hypertrophy with edema of the palpebral conjunctiva	Severe papillary hypertrophy obscuring the visualization of the deep tarsal vessels
Cobblestone papillae	No evidence of cobblestone formation	Few cobblestones	Many cobblestones	Numerous cobblestones
Limbal inflammation or hypertrophy	Absent thickening/no Tranta dots	Thickening with <1/2 limbus with/without few Tranta dots	Thickening >1/2 limbus but not whole with/without many Tranta dots	Thickening of entire limbus with/ without many Tranta dots
Corneal staining (with fluorescein)	Absent	Few scattered or 1 quadrant	More than 1 quadrant but fine	Diffuse or coarse Superficial punctate keratitis

Figure 1: "Ocular Symptom and Signs (OSS) score" [12]

Treatment was offered to all 152 patients in the form of "0.03% tacrolimus" eye ointment. All the patients were guided to put a "rice grain–sized" amount in both eyes on the "lower conjunctival cul-de-sac" every eight hours followed by five minutes of eye closure. This practice was to be performed for 12 weeks. Since, in most cases "vernal keratoconjunctivitis (VKC)" is asymmetrical, left eye was chosen for study. Patients were instructed to follow up at week 4 and 12 of therapy and on each visit OSS score was documented. Efficacy was measured based on frequency of "treatment success" which was defined as "≥ 50% reduction in OSS score from baseline". In case of "treatment failure", appropriate alternative care depending upon consensus of patient and consultant ophthalmologist was provided.

"Data was analyzed by using Statistical Package for Social Sciences (SPSS) 22.00. Quantitative data (age, duration of disease and OSS score) was represented using mean ± standard deviation. Qualitative data (gender and treatment success) was represented by using percentage and frequency. To compare baseline, week 4- and 12-weeks post-therapy OSS scores, Student t-test was used. A p-value of ≤ 0.05 was considered as statistically significant".

Results:

A total of 152 patients were included in the study. Mean age of the study participants was 13.48 ± 5.22 years. 98 (64.47%) of the patients were males and remaining 54 (35.53%) patients were female. Mean duration of VKC was 11.61 ± 3.18 weeks. Mean baseline OSS score was 20.93 ± 2.34. Baseline characteristics of study population are tabulated below in table I:

Table 1: Baseline characteristics (n = 152)

Parameter	n (%)
Mean age	13.48 ± 5.22 years
Gender Male Female	 98 (64.47%) 54 (35.53%)
Mean duration of VKC	11.61 ± 3.18 weeks
Baseline OSS score	20.93 ± 2.34

Mean OSS score after 4 weeks of therapy was 14.87 ± 2.32 and after 12 weeks of therapy was 7.59 ± 3.49. Frequency of "treatment success" was 124 (81.58%); [figure 2].

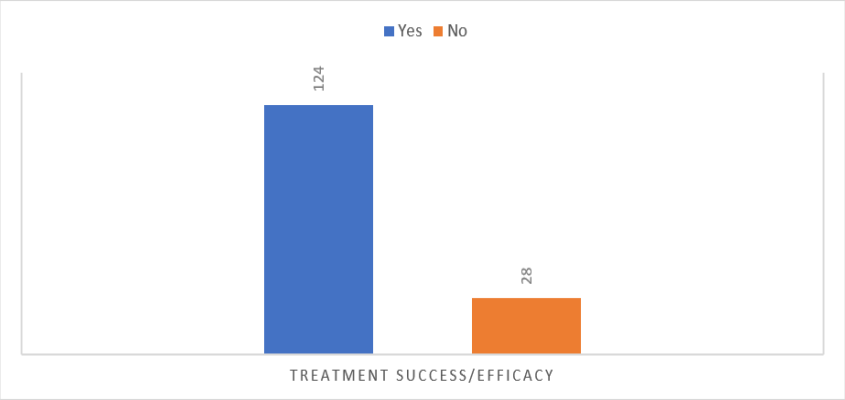

Figure 2: Frequency of treatment success (n = 152)

Discussion:

Poorly treated, first line therapy refractory and long standing "vernal keratoconjunctivitis (VKC)" cases are highly vulnerable to poor visual outcomes since there is a high chance of irreversible loss of vision. [13, 14] Mechanism by which vision is threatened in "vernal keratoconjunctivitis (VKC)" is development of high-grade ulcers on the surface of cornea that may result in permanent damage to corneal surface. [15] For this purpose, it is essential to provide appropriate and timely treatment for this vision threatening ocular pathology. This study focused on efficacy of one such intervention i.e., topical tacrolimus 0.03% in management of refractory "vernal keratoconjunctivitis (VKC)".

In this study, average age of the patients was approximately 13.48 ± 5.22 years which was similar to what has been reported in a study conducted by Lambiase et al. [16] who reported mean age of patients having VKC to be 13.8 ± 8.8 years. Majority of the patients who had "vernal keratoconjunctivitis (VKC)" were males with a male-to-female ratio of 1.9:1. This was congruent with the findings of a study conducted by Ghiglioni et al. [17] and Brindisi et al. [18] both of which reported that male-to-female ratio regarding VKC prevalence ranges from 2:1 to 4:1. One of the major finding of present study was that use of topical tacrolimus resulted in significant reduction of mean OSS score from the baseline at week 4 ($p < 0.001$) and week 12 ($p < 0.001$) after therapy. This was congruent with the findings of studies conducted by Saha et al. [10], Fiorentini et al. [19], Imtiaz et al. [20] and Chatterjee et al. [21] all of which had similar results. In terms of "treatment success" present study found it to be achieved in 81.58%. This was similar to what has been reported in studies conducted by multiple studies. [10, 21]

Present study shows that 0.03% tacrolimus is a highly useful intervention to manage patients who have refractory "vernal keratoconjunctivitis (VKC)". Based on this, it can be safely recommended to be used to effectively treat refractory VKC cases in future. However, this study reported findings only for the short term for which we suggest that it is essential to determine long term effects and outcomes of topical tacrolimus use in refractory cases of "vernal keratoconjunctivitis (VKC)". For this purpose, it is recommended to conduct further studies that primarily focus on the long-term outcomes of use of 0.03% topical tacrolimus.

Conclusion:

In conclusion, 0.03% topical tacrolimus provides successful treatment of refractory "vernal keratoconjunctivitis (VKC)" in 81.58% which shows that it is a highly useful and efficacious mode of intervention to manage this vision-threatening ocular condition.

Limitations

Single center study, limited sample size, short follow up period and absence of control arm were few limitations of this study.

Conflict of interest

None.

Source of funding

None.

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ORIGINAL ARTICLE

Awareness Perception and Preferred Modality of Refractive Error Correction Methods

Nalain Syedah[1], Muhammad Afzal Bodla[1], Maryam Syedah[2]

Abstract:

Objective: To determine the level of awareness and perception towards refractive error correction methods and to analyze the preferred corrective modality i.e. among spectacles, contact lenses and refractive surgery.

Methodology: This was a cross-sectional study conducted at a Tertiary Eye Care Hospital of district Rawalpindi. Age ranging from 18-35 years. Focusing on the objective of the study data was collected with the help of self-administered questionnaire after taking verbal informed consent Data analysis was done using Statistical Package for Social Sciences (SPSS) version 20.

Results: The study included 95 participants; all were spectacle wearers in age group (18-35) out of which 45 respondents were females and 50 were males. The respondents those were in age range between 18-23 (60.9%) had a good level of awareness while participants of age range 31-35(19.0%) had a poor level of awareness towards correction method. Their choice was according to their needs. On investigating preference of individuals regarding vision correction tools, spectacles (62.1%) were found to be the more preferred choice as compared to contact lens (10.5%) and refractive surgery (27.4%).

Conclusion: People with higher education and in age group 18-23 are more aware than those with basic education. Myths about correction methods were also found to be one of the hurdles towards treatment. Knowledge about refractive errors and benefits of using other correction modalities, their advantages and disadvantages should be addressed in the daily health talks to all patients and attendants visiting to eye care professionals. *Al-Shifa Journal of Ophthalmology 2023; 19(3): 121-127.*

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Originally Received: 05 February 2023
Revised: 27 February 2023
Accepted: 2 March 2023

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Introduction:

Vision is an important indicator of health and quality of life and no individual can enjoy his day to day routine work without a normal vision [1] Refractive errors are the major cause of visual impairment and blindness [2]. There are three types of refractive error: Myopia (a state of refractive error in which image formed in front of the retina), Hypermetropia (a refractive error in which image is formed behind the retina) and Astigmatism (blur vision due to irregular shape of the cornea or sometimes the curvature of lens) [2].Globally around 8.2 million people are blind and approximately 145 million people have visual impairment due to uncorrected refractive error [8] .In 2008 The National Blindness and Visual impairment survey

were carried out in Pakistan on the adult population. According to that survey, the prevalence of Refractive errors estimated in Punjab was 67.5 %, in Sindh 57.1%, in NWFP 57.4 %, and in Baluchistan 60.4%. The total estimated 62.1% population of Pakistan was visually impaired due to refractive errors [3,4,5]

To correct these errors different correction methods are now being used. Many people are familiar to spectacle use but other methods are also accessible nowadays such as the use of contact lens and refractive surgery. Some patients consider spectacles as the best choice. Contact lenses and refractive surgery are the correction method of choice in many other conditions depends upon the awareness and perception of that patient. [6,7]

The prevalence of refractive error in the adult population of Pakistan was high and considered as the major risk factor of avoidable blindness. Many studies had shown that level of awareness among visually impaired about correction methods to correct refractive errors were very high but their perception and motivation level was challenging for them.[1]

Marking this issue, we can improve standard and quality of life of a visually impaired person by the expansion of their knowledge and awareness about correction methods and abolishing their associated stigma to their well-being with some correction methods.[1].

Material and methods:

This was a cross-sectional study based on a structured questionnaire. This study was. This study was carried out at a Tertiary Eye Care Hospital of district Rawalpindi and completed in duration of five months from October 2020 to February 2021. Population size (for finite population correction factor or fpc)(N): 100000**,** Hypothesized % frequency of outcome factor in the population (p):6.2%+/-5**,** Confidence limits as % of 100(absolute +/- %) (d):5%

Sample size n = [DEFF*Np(1-p)]/ [(d2/Z21-α/2*(N-1)+p*(1-p)]

By using above equation and prevalence of refractive error in Punjab (50%) it is estimated that sample size for the study will include 95 participants. After collection of data it was coded and entered into Statistical Package for Social Sciences (SPSS) version 20. For inferential analysis, Chi square test for independence was used for finding associations between outcome variables and independent variables. Chi square test was used to find an association between two categorical data sets and P value <0.05 was considered significant. The study was conducted after the approval of Hospitals Ethical review board. Verbal informed consent was taken from every participant who became part of the study. The data collected was used only for academic purpose and confidentiality of the data and the participant was ensured. Individuals seeking for help in better choice according to their refractive status were also guided.

Results:

A total of 95 participants were included in this study. The mean age of participants was 25.13 years (SD 5.197) ranging from 18-35 years Male participants constituted 52.6% of the whole sample. Age was categorized into three groups. Most of participants were undergraduate (62.1%), A higher proportion of participants had residency in Rawalpindi (78.9%)

Mostly respondents were aware of contact lens usage instead of spectacles 55(57.9%) and few were unaware 25(26.3%). About 41(43.2%) participants don't know about side effects of contact lenses while 38(40%) knew about side effects of contact lens usage. Most of participants 52(54.5%) were aware of the fact that colored contact lenses can be worn exclusively for cosmetic purpose on normal eyes while 26(27.4%) were unaware. About (48.4%) of participants had a good awareness that contact lenses could use for both refractive error correction and also for cosmetic properties. Almost 49 (51.6%) members were unaware of the possibility of

refractive surgery being used to improve the eyesight and decrease or eliminate the dependence on spectacles. While 38(40%) respondents were aware. Only 42(44.2%) of the respondents were aware of the side effects of refractive surgery while mostly respondents didn't know about side effects of refractive surgery 51(53.7%)Out of 95 participants 59 (62.1%) participants preferred spectacles as they feel it stable, comfortable and convenient way of correction. Lesser individuals 10 (10.5%) preferred contact lens for correction of refractive error while few of them preferred refractive surgery 26 (27.4%).

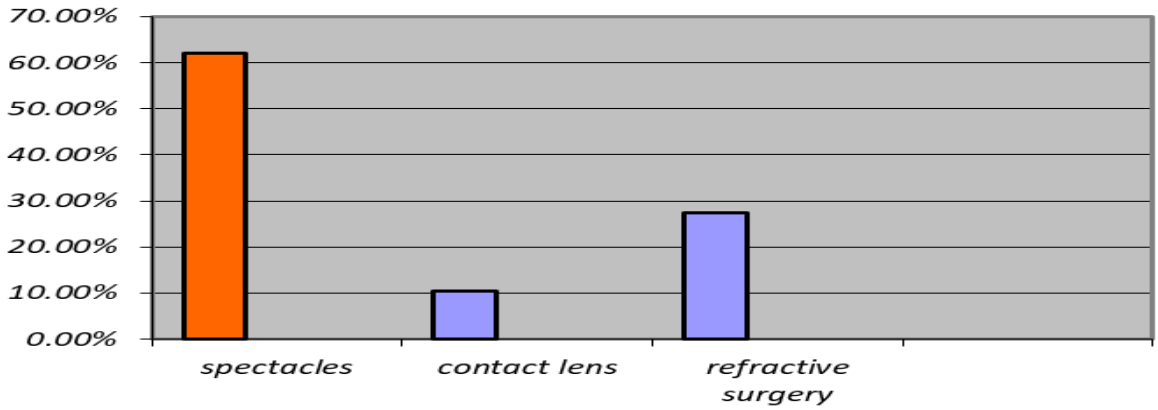

Fig 1: Graph showing preferred modality of correction of

Table 1: Level of perception towards correction methods

Characteristics	Frequency (N=95)	Percentage
Do you think wearing spectacles affects your opportunity for education?		
Agree Neutral Disagree	37 10 48	39% 10.5% 50.5%
Do you think wearing spectacles affects your opportunity for employment?		
Agree Neutral Disagree	27 21 47	28.5% 22.1% 49.5%
Do you think wearing spectacles affects your opportunity for marriage?		
Agree Neutral Disagree	14 26 55	14.7% 27.4% 57.9%
Do you believe wearing spectacles changes the way people perceive you as attractive?		
Agree Neutral Disagree	24 23 48	25.3% 24.2% 50.6%

Do you believe wearing spectacles reduces the power of the eyes?		
Agree Neutral Disagree	31 15 49	31.6% 15.8% 51.6%
Do you believe people perceive wearing spectacles as a sign of wealth?		
Agree Neutral Disagree	5 15 75	5.3% 15.8% 79%
Do you think, wearing spectacles is a cosmetic blemish?		
Agree Neutral Disagree	17 18 60	17.9% 18.9% 63.2%
Do you think, wearing spectacles is a sign of intelligence?		
Agree Neutral Disagree	6 19 70	6.3% 20% 73.7%
Do you think using spectacles can lead to reduced respectability?		
Agree Neutral Disagree	0 5 90	0% 5% 90%
Do you think wearing spectacles reduces personal activities such as sport?		
Agree Neutral Disagree	91 3 1	95.8% 3.2% 1.1%
Do you think the best way to prevent yourself from vision loss is wearing glasses?		
Agree Neutral Disagree	62 10 10	79.5% 10.5% 10.5%
Do you think , spectacles may be used to relieve discomfort such as headache , Photophobia and tearing?		
Agree Neutral Disagree	44 18 33	46.4% 18.9% 34.7%
Do you believe that using spectacles is only for old people?		
Agree Neutral Disagree	3 5 87	3.2% 5.3% 91.6%

Overall perception:

Fig 2: Graph showing Perception of participants towards correction methods

Chi-square test was conducted to find the association of awareness towards demographic profile (age, Gender, education) of the participants, There is a significant association between age groups and educational status towards awareness **(P=0.001)** while there is no significant association between Gender and awareness of participants. Chi-square test was used to find out the association between perception level towards sociodemographic profile of participants. No statistically significant association was found.

Discussion:

This study was a population based survey on refractive error correction methods awareness, perception and their preference of correction methods amongst the random selected people of Al-Shifa Trust Eye Hospital Rawalpindi. The maximum participants (78.9%) belong to urban area of Rawalpindi city. This study was hospital based survey and participants were randomly selected without any criteria except specified age group (18-35). Awareness in this study does not mean that respondents had complete knowledge about the subject, because it was found that even with the reality that untreated refractive error is the leading cause of visual impairment and blindness globally, the level of awareness towards correction methods of refractive error was comparably low among population

On investigating preference of individuals regarding vision correction tools, spectacles (62.1%) were found to be the more preferred choice as compared to refractive surgery (27.4%) followed by contact lens (10.5%). Contact lenses were the least preferred choice due to fear of their side effects. Some of the respondents unexpectedly mentioned fear of refractive surgery and its complications are the main reason for not undergoing such correction method.

A study was conducted on awareness and attitude towards refractive error correction methods and preferred modality in paramedical students in Era University, Luck now, India. This study concluded that 14.2% were aware of refractive surgery while according to our findings only (51.6%) about the awareness of refractive surgery to eliminate dependency on spectacles and to improve vision. [(1)]

In another study which was conducted in Nepal in which majority (87.3%) preferred spectacles 4.8% preferred contact lens and only 8% preferred refractive surgery as method of refractive correction and same in this research spectacles (62.1%) were found to be the more preferred choice as compared to contact lens (10.5%) and refractive surgery (27.4%).[(8)]

A survey was carried out in Mashhad by Moghaddam et al in 2013 on Awareness and attitude toward refractive error correction methods. This study demonstrated that Awareness and perception of refractive correction methods was low among the participants of this study. Although, ophthalmologists were the first source of consultation on sight impairments among respondents, a predominant percentage of subjects were not even aware of obvious differences between an ophthalmologist and an optometrist and very low level of knowledge of vision correction tools. In this study more than half of the participants

(53.7%) were unaware of the difference between both professions. [9,14]

Another study by S.Usgoankar and Priyanka Tambe in 2018 to check level of awareness and attitude towards correction methods in Goa, India concluded that overall, 75% of the participants had a clear idea of 'ophthalmologist' and 'optometrist' terms. 59%, 77.5% and 62% of respondents had no information of contact lens application instead of spectacles, cosmetic contact lenses and contact lens side effects, respectively. 64% of participants were not aware of the possibility of refractive surgery for improving their sight and decreasing their dependency on spectacles. Awareness about refractive surgery's adverse effects was only 12%. Awareness and attitude towards refractive correction methods was moderately low among the participants of this study whereas in this study awareness towards contact lens usage instead of spectacles, contact lens side effects and idea of cosmetic contact lens was predominantly low among participants. [10,15]

In contrast with other studies it is noticed that our community had very low level of awareness towards refractive error correction methods, level of awareness depends upon the educational status and the age of participants. with spectacles being the most preferred method of refractive correction. Developing country like India and Pakistan with a huge population with refractive errors, putting a huge burden on generally medical eye care. Effective counseling of all patients related to choose of corrective modality in eye hospital may also change their level of awareness and perception [11,12,13].

Conclusion:

The results of this study demonstrate the major loose ends in the awareness towards correction methods and importance of educational status of participants in increasing the level of awareness towards correction methods, People with higher education and in age group 18-23 are more aware than those with basic education. The perception level of the participants had no significant relation towards Age, gender and educational status, almost half of the participants had good perception (49.5%) and remaining had bad perception (50.5%) towards vision correction tools. On investigating preference of individuals regarding vision correction tools, spectacles (62.1%) were found to be the more preferred choice as compared to refractive surgery (27.4%) followed by contact lens (10.5%) Their choice was according to their needs still there is much need to emphasize the publicity level of awareness towards correction methods. Myths about correction methods were also found to be one of the hurdles towards treatment.

Knowledge about refractive errors and benefits of using other correction modalities, their advantages and disadvantages should be addressed in the daily health talks to all patients and attendants visiting to eye care professionals.

Recommendations for the future:

Further such studies should be conducted on a larger scale with large sample size

Awareness and educational programs should be organized for the community about latest technologies of vision correction methods.

For future researchers it is recommended that impact survey should be carried out by firstly removing all the hurdles and myths related to vision correction tools and educating them about all corrective modalities.

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CASE REPORT

Impact of Gadgets on Amblyopic Therapy and Risk of Astigmatism Development: A Prospective Case Report of a 5 years old

Mutahir Shah[1], Saif Ullah[1]

Abstract:
This prospective case report was carried out to investigate the effect of electronic gadget use during amblyopic therapy in a 5-year-old child with monocular hyperopia of +6DS. The child received glasses and underwent patching therapy for the amblyopic left eye while using electronic devices. The therapy successfully improved visual acuity over two years, an unexpected development of with-the-rule astigmatism in the left eye raised concerns about the role of gadget use in astigmatism development. This prospective case report highlights the efficacy of patching therapy combined with gadget, but suggests the need for further investigation of the potential risks of developing astigmatism. *Al-Shifa Journal of Ophthalmology 2023; 19(3): 128-130. © Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.*

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Originally Received: 8 April 2023
Revised: 29 April 2023
Accepted: 1 May 2023

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Introduction:

Amblyopia, often referred to as "lazy eye," is a common vision disorder in the absence of any organic pathology occurred in children that can lead to irreversible vision impairment if not treated promptly.[1] Decreased visual acuity in one or both eyes is a symptom of aberrant binocular interaction that occurs during the critical time of neurodevelopment in the visual cortex.[2] If one eye has a BCVA that is two lines lower than the other, this is considered clinically to be monocular amblyopia. In children, amblyopia is the leading cause of monocular vision loss in one eye, making it an important public health concern.[3] Previous estimates of the worldwide prevalence of amblyopia have varied widely, from 0.2% to 5.3% of the population, depending on factors like the definition of amblyopia, the location of the studies, and the heterogeneity of the studies themselves.[4] Among the world's populations, Europe has the highest incidence of amblyopia, with a global pooled prevalence estimate of 1.36 percent in 2022 and 1.75 percent in 2018.[5]

Case Report:

A case of 5-year-old child with monocular hypermetropia of +6.0DS in left eye, presented to the eye OPD of a tertiary care hospital in Islamabad. His other eye was emmetropic. Cycloplegic refraction was done using 1 % cyclopen. The patient was diagnosed with monocular ametropic amblyopia in left eye. Presenting visual acuity was 1.0 Log MAR, that improved to 0.96 log MAR after refraction. The patient was assessed for varying degree of visual acuity and refractive errors in both eyes and was followed closely for two years. The glasses were prescribed and parents were instructed to patch the eye 4-6 hours a day and the child was allowed to use smartphone/tab for games and other activities during patching time. Visual acuity and refractive errors were assessed every six months. A comprehensive eye examination, including assessment of astigmatism, was performed at each follow-up. Informed consent was taken from the guardians. All steps were followed according to Helsinki Declaration.

Visual acuity and refractive errors were monitored regularly. The results revealed a significant improvement in visual acuity from 0.96 Log MAR to 0.1 Log MAR in the amblyopic left eye over two years of treatment, demonstrating the efficacy of patching therapy combined with gadget use. However, an unexpected outcome was the development of with the rule astigmatism (-2.0 D) in the left only eye during this period, which prompted further investigation. Treatment often includes correcting refractive errors with glasses and patching therapy to encourage the use of the amblyopic eye. Over the two-year follow-up period, visual acuity in the left eye improved significantly from 0.96 Log MAR to 0.6 Log MAR in first six months without inducing any astigmatism. However, in next 3 visits the VA of the child was improved from 0.6 to 0.1 Log MAR but the child gets monocular with the rule astigmatism in amblyopic eye with a magnitude of 2D. Although the results indicating successful amblyopic therapy in monocular ametropia, but the occurrence of monocular astigmatism raised question regarding used of electronic gadgets in early life and development of astigmatism.

Discussion:

Refractive error correction has been proven to enhance visual acuity (VA) in both unilateral and bilateral amblyopia. Approximately one-third of cases of anisometropic, mixed, and strabismic amblyopia resolve without further intervention after 10-30 weeks of optical treatment alone, demonstrating a significant improvement in VA of 2 logMAR lines or more.[3]

Our case report revealed that in monocular amblyopia gadget assisted patching had a significant role in improvement of visual acuity. Previously published studies showed that positive impact of gadget-assisted patching therapy on amblyopia treatment, as evidenced by the significant improvement in visual acuity.[3,5] Video games have gained substantial attention as a possible amblyopia treatment due to the rapid development of technology. The visual demands and stimuli of action video games can translate to real-world situations involving, for example, crowding, light sensitivity, contrast sensitivity, visual attention, and many components of visual short-term memory. The possible reason for that will be the release of dopamine a hormone that enhance the neuroplasticity of the brain and as a result improvement in visual acuity in amblyopic Eye. [3] The first strategy involves, playing video games usually in a monocular fashion with the non-amblyopic eye occluded. This method is predicated on the idea that engaging in such activities can assist alleviate visual distractions and improve a variety of spatial vision skills that can aid in the detection of things. We followed the modality of using electronic gadgets during the amblyopic therapy period for the child. However, the emergence of astigmatism during the treatment period raises questions about the

potential influence of gadget use on refractive development. Prolonged screen time and close-up focusing could potentially contribute to changes in ocular physiology, including corneal curvature and axial length. Understanding the underlying mechanisms behind the progressive increase in corneal astigmatism that occurs with screen time exposure is crucial for the development of effective strategies for its treatment. Studies showed that with the rule astigmatism is highly correlated with the position and pressure exerted by the upper eyelid.[6] Studies reveled that extended periods of downward gazing while using electronic screens can result in a sustained application of force on the vertical corneal meridian, which in turn causes an increase in the curvature of the cornea.[6,7] Despite the lack of evidence in this study, further research is necessary to examine the suggested mechanism and its correlation with the pattern of astigmatism over an extended period of time.

Conclusion:

This case highlights the effectiveness of gadget-assisted patching therapy in improving visual acuity in amblyopic children. However, clinicians should remain vigilant for potential side effects, such as the development of astigmatism. Further research is needed to better understand the relationship between gadget use and refractive changes in pediatric patients undergoing amblyopia treatment, allowing for the optimization of therapy protocols and long-term visual outcomes.

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