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Short Communication

Original Article

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Effect of Pterygium Excision Surgery on Corneal Astigmatism in Patients Undergoing Pterygium Excision Surgery at Tertiary Eye Care Hospital

Anupama Raju Taklikar[1], Kedarnath Uday Patil[2], Syeda Zeba Fatima[3], Pavan MK.[4]

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Abstract

Aim: This study aims to evaluate the extent and nature of astigmatism following pterygium excision surgery in a sample of 50 patients at a tertiary eye care center. Astigmatism is assessed using manual keratometry and refraction.

Setting & Design: This was a prospective Observation study conducted between August 2023-2024 over a period of 12 months at Tertiary Care Hospital. A total of 50 patients who underwent pterygium excision surgery were included in the study. All patients were followed up postoperatively at regular intervals to assess changes in astigmatism.

Methods: Patients with pterygium who met the inclusion criteria were thoroughly examined and underwent pterygium excision with Limbal Conjunctival Autografting surgery.

Statistics: Changes in astigmatism were evaluated using paired t-tests to compare preoperative and postoperative measurements.

Conclusions: Pterygium excision with conjunctival autografting significantly reduces astigmatism and improves visual acuity in patients with primary pterygium.

Keywords: Pterygium, Astigmatism; Pterygium Excision Surgery; Conjunctival Autograft; Tertiary Eye Care; Keratometry.

INTRODUCTION

Pterygium is a degenerative, fibrovascular growth originating from the conjunctiva and extending onto the cornea. It predominantly occurs nasally, though it can occasionally present temporally. This condition is associated with environmental factors such as chronic exposure to ultraviolet (UV) light, dust, wind, and dry conditions. Clinically, pterygium can cause irritation, redness, and tearing. When the growth invades the corneal region, it can induce significant refractive changes, notably astigmatism, due to the mechanical traction it exerts on the corneal surface.

Astigmatism refers to a refractive error where the eye does not focus light evenly on the retina, often due to an irregularly shaped cornea. The presence of a pterygium alters the corneal curvature, leading to astigmatism, which may persist or even be exacerbated after surgical removal. The tension from the fibrovascular growth induces with-the-rule astigmatism (more curvature along

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the vertical meridian) and may persist or change to against-the-rule (more curvature along the horizontal meridian) post-operatively.

Understanding the pattern and degree of astigmatism after surgery is crucial for improving visual outcomes and patient satisfaction.

While corneal topography is a precise tool for assessing changes in corneal shape and astigmatism, it is not always available in all clinical settings. This study evaluates post-surgical astigmatism in a tertiary care setting using manual keratometry and subjective refraction, offering insights into the changes in refractive status induced by pterygium surgery.

METHODS

Study Design and Setting

This is a prospective observational study conducted over a period of 12 months at a Department of Ophthalmology, Navodaya Medical College Hospital & Research Center, Raichur, Karnataka. A total of 50 patients who underwent pterygium excision surgery were included in the study. All patients were followed up post-operatively at regular intervals to assess changes in astigmatism.

Patient Selection

Inclusion Criteria

- Adults aged 20-60 years with primary pterygium.
- Patients willing to provide informed consent.
- No history of ocular surgery or trauma.
- No other significant ocular surface diseases.

Exclusion Criteria

- Patients with recurrent pterygium.
- Patients with corneal pathology unrelated to pterygium.
- Systemic diseases known to affect wound healing, such as diabetes.
- Contact lens wearers.

Preoperative Assessment

- Visual Acuity
- Thorough Slit Lamp Biomicroscopy
- Retinoscopy
- Fundus Examination
- Astigmatism was assessed pre-operatively and post-operatively using manual keratometry and refraction. Measurements were taken at baseline (preoperative) and at 1 month, 3 months, and 6 months post-surgery. The type (with-the-rule, against-the-rule, or oblique) and degree of astigmatism were documented. Visual acuity was also assessed at each follow-up visit using Snellen's chart.
- **Manual Keratometry:** Used to measure the curvature of the anterior corneal surface along the principal meridians.
- **Refraction:** Conducted by an experienced optometrist to determine the refractive status and best-corrected visual acuity.

Surgical Technique

All surgeries were performed by experienced ophthalmic surgeons using a standardized procedure. Pterygium excision was carried out using a bare sclera technique, followed by conjunctival autografting. The head and body of the pterygium were excised meticulously, and a conjunctival graft, harvested from the superior bulbar conjunctiva, was secured in place using absorbable sutures. This method is widely accepted due to its lower recurrence rates and favorable cosmetic outcomes.

Statistical Analysis

Data were analyzed using statistical software. Changes in astigmatism were evaluated using paired t-tests to compare preoperative and postoperative measurements. A p-value of <0.05 was considered statistically significant.

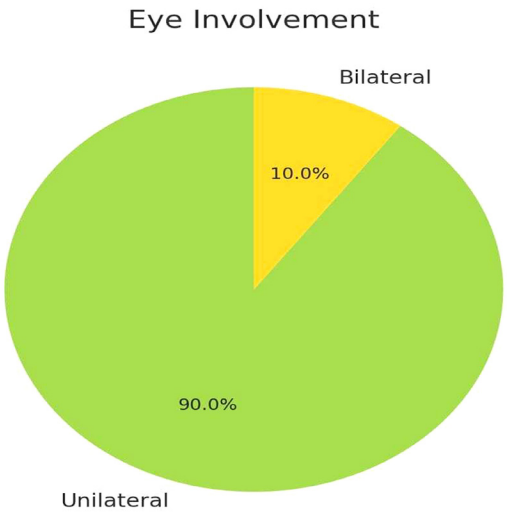
RESULTS

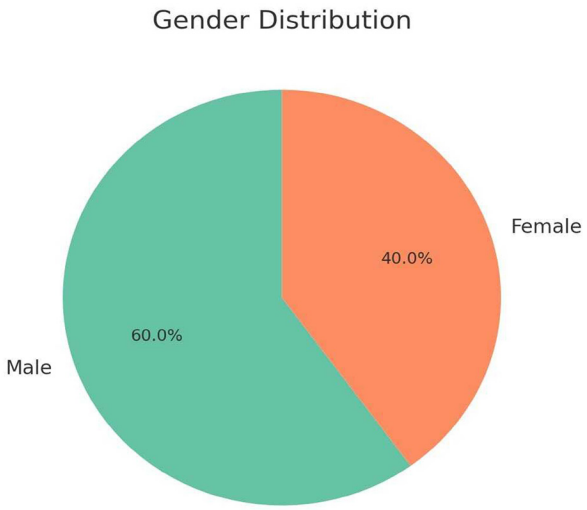
Demographic and Clinical Characteristics

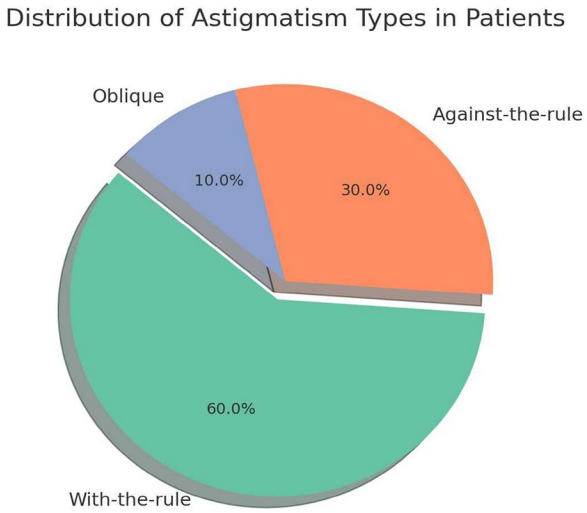
- Mean Age: 45.3 years (range: 20-60 years).
- Gender Distribution: 60% male, 40% female.
- Pterygium Location: 70% nasal, 30% temporal.
- Eye Involvement: 90% unilateral, 10% bilateral (only the worse affected eye was considered for bilateral cases).

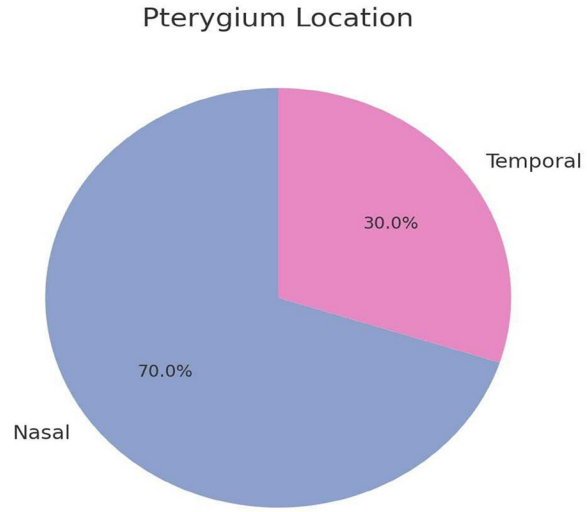
Preoperative Findings

- Mean Preoperative Astigmatism: 2.6 diopters (D).
- Astigmatism Type:
  - With-the-rule: 60% of patients.
  - Against-the-rule: 30% of patients.
  - Oblique: 10% of patients.
- Mean Visual Acuity: 6/18 preoperatively.









Postoperative Findings

1 Month Postoperative:

- Mean astigmatism reduced to 1.9 D.
- Significant reduction in with-the-rule astigmatism cases.
- Visual acuity improved in 80% of patients (mean: 6/12).

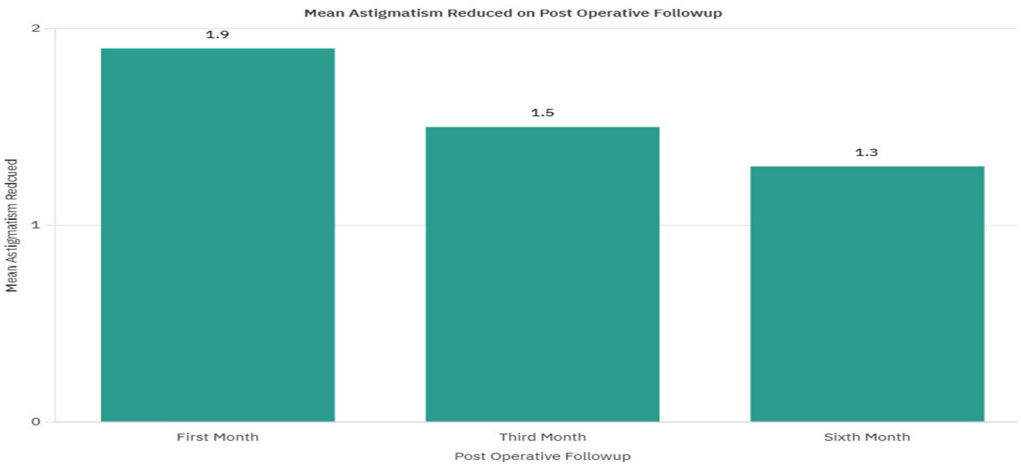
3 Months Postoperative:

- Mean astigmatism further reduced to 1.5 D.
- Shift toward against-the-rule astigmatism in some patients (20%).
- Continued improvement in visual acuity (mean: 6/9).

6 Months Postoperative:

- Mean astigmatism stabilized at 1.3 D.
- Predominantly with-the-rule astigmatism (65%), against-the-rule (25%), and oblique (10%).
- Visual acuity achieved 6/6 in 50% of patients, with 40% achieving 6/9.

Follow ups	Mean Visual Acuity on Snellens Chart
1st Month	6/12
3rd Month	6/9
6th Month	6/6



Statistical Analysis

- Significant reduction in astigmatism from preoperative to postoperative measurements ($p < 0.01$).
- Visual acuity improvement was significantly correlated with astigmatism reduction ($p < 0.05$).

Complications and Management

Complications: Minimal complications were noted. Two cases of graft dehiscence were managed with resuturing.

Recurrence Rate: No recurrences were observed within the 6-month follow-up period.

DISCUSSION

The findings of this study demonstrate a significant reduction in astigmatism following pterygium excision surgery with conjunctival autografting. Preoperative astigmatism was mainly due to the mechanical traction exerted by the pterygium on the cornea, causing a steepening of the vertical meridian (with-the-rule astigmatism). Post-surgical relaxation of this tension resulted in a reduction of astigmatism and improved corneal symmetry.

The shift observed in some patients toward against-the-rule astigmatism postoperatively may be attributed to changes in corneal biomechanics and wound healing processes. The stabilization of astigmatism at 6 months suggests that the cornea adapts over time following the surgical intervention, leading to more regular curvature.

This study did not utilize corneal topography, which is often considered the gold standard for assessing corneal surface changes. However, manual keratometry and subjective refraction provided valuable data on refractive changes, demonstrating their utility in clinical settings where advanced diagnostic tools may not be available. Regular follow-up and early detection of refractive changes are crucial for timely intervention and optimization of visual outcomes.

1. Zaida *et al..*, conducted a study on 60 eyes of 60 patients. Ages were between 34 and 56 years, divided randomly into 3 groups; group A included 20 patients that were treated with pterygium excision with bare sclera technique plus MMC application for 3 minutes at site of excision. Group B: 20 patients that were treated with pterygium excision with conjunctival autograft. Group C: 20 patients that were treated with pterygium excision with limbal/conjunctival autograft. The postoperative assessment included refraction and pentacam on visits at 1, 3, and 6 months after surgery. In all groups, BCVA changes 6 months postoperatively were statistically significant, while Spherical and Cylindrical error changes were statistically insignificant. Average K and corneal thickness changes were statistically insignificant, while anterior corneal astigmatism changes were statistically insignificant in group A, and significant in groups B and C. Pterygium grade also affects corneal astigmatism. Several studies conducted previously prove that the amount of induced corneal astigmatism increases with the increase in the size of Pterygium.
2. Gumus *et al..*,found a significant correlation

between the size of Pterygium and induced corneal astigmatism.

3. Misra *et al..*, concluded that with the size of Pterygium extending from 2.5mm, preoperative astigmatism increases. The mean best corrected visual acuity preoperatively was 6/7.5, improving significantly to 6/6 at 1 month (P = 0.001) with this improvement remaining stable at 3 months postoperatively (P = 0.34). There was no significant change in subjective astigmatism, however, mean topographic astigmatism decreased significantly at 1 month (4.36 diopter, P < 0.01) and remained unchanged at 3 months (P < 0.01).
4. Maheshwari S. *et al..*, Concluded that the amount of astigmatism varied with the grade of pterygium. Mean astigmatism in eyes with grade II pterygium was 2.92D ± 0.65D. In eyes with grade III pterygium the mean astigmatism of 3.83 ±1.75D. 9.42 ± 2.64D of mean astigmatism was noted in eyes with grade IV pterygium. The amount of astigmatism was seen to increase with the grade of pterygium (P = 0.000001). The preoperative refractive cylinder was 4.60 ± 2 D, which improved to 2.20 ± 2.04 D (P = 0.00001) postoperatively. Visual acuity remained the same in 21 (58.33%) eyes. 15 eyes (41.67%) showed 1 or 2-line improvement in vision. The mean visual acuity preoperatively was 0.53 ± 0.35 D which improved to 0.68 ± 0.34 D (P = 0.001) postoperatively.

CONCLUSION

Pterygium excision with conjunctival autografting significantly reduces astigmatism and improves visual acuity in patients with primary pterygium. The findings of this study, based on keratometry and subjective refraction, underscore the effectiveness of this surgical approach. Regular monitoring of astigmatism postoperatively is essential to ensure optimal visual rehabilitation and patient satisfaction.

Future research incorporating corneal topography and long-term follow-up may provide a more comprehensive understanding of corneal changes and the impact of surgical techniques on refractive outcomes.

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Original Article

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Outcomes of Retinoblastoma Treated as per Protocol based on International Classification of Retinoblastoma

Sanjiv Kumar Gupta[1], Nishant Verma[2]

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Sanjiv Kumar Gupta, Nishant Verma. Outcomes of Retinoblastoma treated as per protocol based on International Classification of Retinoblastoma. Ophthalmol Allied Sci. 2024;10(2):45–53.

Abstract

Context: There is a lack of universally applicableand updated treatment protocol for retinoblastoma in India, which causes hurdles in the management of this childhood cancer. We have described the outcomes of subjects treated using our protocol (based on the International Classification of Retinoblastoma)that could be adopted for the management of retinoblastoma.

Aim: The international classification of retinoblastoma defines the prognosis-based classification of subjects. The protocol followed at our institute is based on the ICR and the retinoblastoma outcomes for the last 5 years have been analysed and presented.

Setting & Design: Tertiary care centre-based retrospective study.

Methods and Material: Five-year records of the retinoblastoma patients treated using a standard ICR-based protocol were analysed for clinical profile, treatment delivered, and outcomes. Appropriate statistical tests were used for parametric/non-parametric data and categorical variables to compare the groups. Kaplan-Meier survival analysis was used to describe the survival probability. A p-value of 0.05 was considered significant.

Results: There were 209 subjects and 251 retinoblastoma-affected eyes which were included and analysed in the study. The overall survival rate was 90.10% and 1, 2, 3 and, 5-year survival estimates were 96.6%, 94.9%, 92.2%, 88.3% respectively. Forty-two (16.73%) eyes with retinoblastoma were retained after local tumour control and 209 (83.27%) eyes needed enucleation.

Conclusions: The retinoblastoma treatment protocol based on ICR has shown improvement in the outcomes at our centreanddefined the resources needed for the management of retinoblastoma.

Keywords: Retinoblastoma; retinoblastoma treatment protocol; IRC based treatment protocol; eye cancer; ICR; classification of retinoblastoma.

Key Messages: The described retinoblastoma protocol can be used to initiate and build upon a national SOP for the management of retinoblastoma.

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INTRODUCTION

In India, the management of retinoblastoma has a different clinical picture compared to the developed nations due to the socioeconomic conditions, advanced stage at the time of presentation, and limitation of resources and specialized centres for the management of the disease. To reduce the delay in the management of retinoblastoma, a suitable protocol is needed that will not only provide a guideline for standardizing the management of retinoblastoma at apex centres but also delineate the management responsibilities which can be shared by the primary and secondary levels of medical care. This will improve the outcomes by providing early management at the first point of care and reduce the burden of the advanced stages of retinoblastoma which is the main reason for higher mortality in India.

Such a protocol can also help the planning agencies to decide the minimum resources in terms of infrastructure, equipment, and manpower to equip the present tier-based health care system for the management of retinoblastoma. If we look at the present scenario regarding such protocol we find old publications by the ICMR (Indian Council for Medical Research), published in 2010, by Chawla *et al.* in 2017, Singh *et al.* in 2017. However, these publications focus mainly on the review of the literature and outcomes of their patients and not on providing any protocol or algorithm for deciding the treatment modality for various stages of the disease.

Other available treatment protocols have been designed by and for advanced centres worldwide and include advanced treatment modalities like intra-arterial chemotherapy (IAC) and brachytherapy, apart from other options. The advanced treatment modalities may not be available/feasible in less developed centres/ nations. Thus, there is a need for a protocol that is aligned with ICR and includes treatment modalities that are available at less advanced centres. The international classification of Retinoblastoma (ICR) has been developed keeping in mind the spread of the disease and the prognosis after appropriate treatment for the stage of the disease. The success of ICR in defining the treatment protocol has been discussed in the existing literature and is a useful tool for deciding the treatment plan for retinoblastoma subjects.[4-7]

In the above context, we have been managing retinoblastoma subjects for more than 3 decades and have developed and evolved a treatment protocol over that period. The present protocol which is suitable for our group of patients and is aligned with the resources at our centre is based on the ICR. This institutional protocol has been instituted at our centre since 2015. This study was done to analyse the outcomes of the retinoblastoma subjects treated at our institute using this protocol. Being a representative tertiary care centre in central India the treatment protocol used at our institute can be used by other institutes treating retinoblastoma in India and nations with similar socioeconomic structures and can replicate the success we had.

This retrospective study evaluated the outcomes of retinoblastoma subjects treated using "The KGMU retinoblastoma treatment protocol".

SUBJECTS AND METHODS

The records of all the subjects treated for retinoblastoma fromJune 2015 to May 2022 were analysed to evaluate the demographic, clinical features, the status of the disease at the presentation, the treatment provided, and the outcome. The subjects who did not comply with the treatment were excluded from the analysis. Adherence to the declaration of Helsinki was maintained concerning the confidentiality of the subject's identity.

The subjects were subjected to an MRI/CT (Computed Tomogram) scan, and examination under anaesthesia at the time of enrolment for grading the disease as per the International Classification of Retinoblastoma. The treatment was decided as per the protocol developed at our institute for the patients (Fig. 1). The treatment modalities used were LASER photocoagulation, Cryo therapy, enucleation, intravitreal carboplatin injection, systemic chemotherapy (VEC regimen)[1,] and local external radiotherapy, depending on the stage of the disease and our protocol (Fig. 1).

Data were analysed using MedCalc (Version 14.8.1). Descriptive statistics were used as needed. Categorical variables were compared using the Chi Sq/Fisher's exact tests. Kaplan-Meier survival analysis was carried out to study the survival pattern among different groups. A P-value <0.05 was considered statistically significant.

RESULTS

The records of children treated for retinoblastoma from June 2015 to May 2022 at our institute were

reviewed, and we found 216 subjects who were enrolled for retinoblastoma at our tertiary care center. Among those, 209 children completed the treatment as per the KGMU retinoblastoma treatment protocol at our institute.

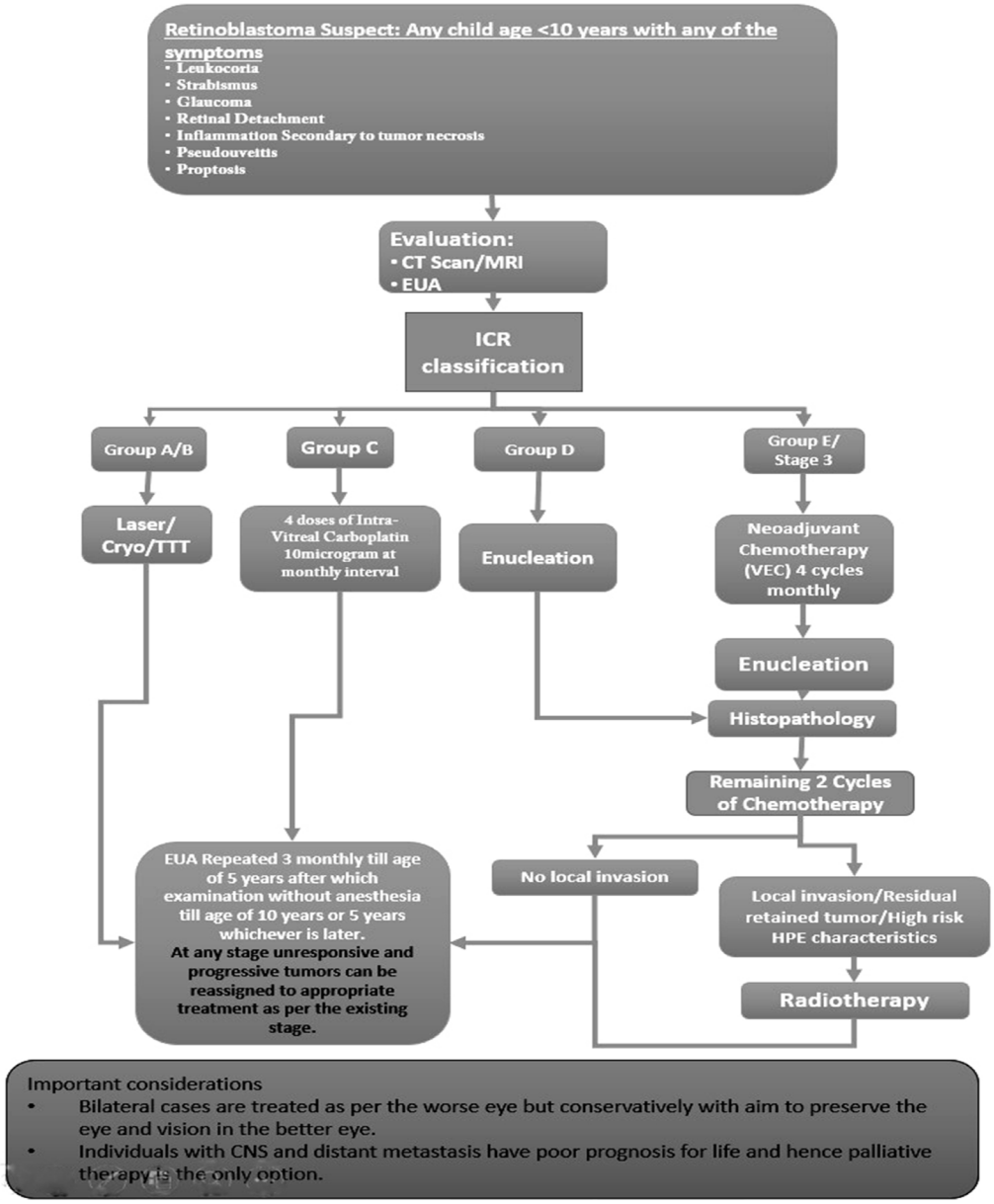


Fig. 1: International Classification of Retinoblastoma (ICR) Based Management Protocol for Retinoblastoma Subjects

There were 136 (65.1%) male vs. 73 (34.9%) female subjects. There were 167 (79.9%) cases of unilateral disease and 42 (20.1%) cases of bilateral disease. Table 1.

The average age at the time of first symptoms was 28.76 months (range 0.0-103, SD 21.09). This was statistically similar in both male and female subjects with a p-value of 0.74 (Mann-Whitney test). All subjects' average age at presentation was 34.12 months (Range 1.7-104.8, SD 21.93), and the average age at presentation in males and females was statistically similar (p=0.88). However, unilateral cases presented (35.50 months) later than the bilateral cases (28.90 months) but this difference was not significant (p=0.14). Similarly, the symptoms were also noted earlier in the bilateral patients (23.30 months) than in the unilateral cases (30.24 months) but the difference was statistically insignificant (p=0.07). Table 1.

Table 1: Clinical and demographic details of patients included in the study

	Unilateral (167)	Bilateral (42)	p-value	Average age at enrolment (Months)	p-value	Average age at appearance of first symptom (Months)	p-value	Latency in presentation (Months)	p value
Male (136)	111	25	0.5	34.25	0.88	29.33	0.74	5.41	0.77
Female (73)	56	17	—	33.89	—	27.75	—	6.72	—
Unilateral	—	—	—	35.5	0.14	30.24	0.07	5.39	0.24
Bilateral	—	—	—	28.9	—	23.3	—	7.77	—
	167	42	—	34.12 (1.7-104.8, 21.93)	—	28.76 (0.0-103, 21.09)	—	5.87 (0.2-64.8, 7.45)	—

The average latency in presenting at the hospital, from the date of the first symptom, which can be considered a surrogate for the awareness among the public and referral system efficiency was 5.87 months (Range 0.2-64.80 months, SD 7.45). The latency in the presentation was similar across the genders (p=0.77) and whether the disease was unilateral or bilateral (p=0.24). When the latency in the presentation was compared across the ICR groups it was evident that the children with ICR group E and extraocular presentation had a significantly longer duration (Average 6.08 and 16.35 months respectively) with a p-value of <0.001 (ANOVA test). However, the subjects with disease falling in groups A, B, C, and D, albeit in diverse groups, had statistically similar presentation latency.

Only 7 (3.3%) subjects had a family history of retinoblastoma while 6 (2.9%) children had a history of other malignancies in any of the blood relatives.

Out of the total of 209 subjects, there were 167 (79.90%) children with unilateral disease and 42 (20.10%) children had bilateral disease. The total number of eyes with retinoblastoma was 251, only the right eye was involved in 93 subjects (44.5%) vs 74 (35.4%) subjects had only left eye involvement, 42 (84 eyes) subjects had Bilateral involvement. Most of the eyes had group E (ICR) disease [106 (42.23%)] at the time of enrolment followed by 74 (29.48%) in group D, 29 (11.55%) in group C, 20 (7.97%) and 12 (4.78%) eyes in group B & A respectively. There were 10 (3.98%) eyes with orbital metastasis (Stage 3) at the time of enrolment. None of the subjects had CNS or distant metastasis.

Out of 251 eyes affected with retinoblastoma, 209 eyes (83.27%) eyes were enucleated. There were 42 (16.73%) retinoblastoma-affected eyes that were retained and out of those, 32 (76.19%) eyes had useful vision (Better than 6/24) at the time of reporting. Bilateral enucleation was done in two children with bilateral advanced disease with no visual potential. Out of the total 209 subjects, 20 (9.57%) eventually died because of Retinoblastoma metastasis and associated complications.

As per the "KGMU Retinoblastoma treatment protocol" Thirty-nine (18.66%) eyes of 39 subjects underwent primary enucleation without local or systemic treatment. Table 2. The rest of the enucleated eyes (170, 81.33%) received neoadjuvant chemotherapy to minimizethe possibility of systemic metastasis. Looking at the local treatment given to Retinoblastoma eyes, 5 eyes received LASER photocoagulation, and 5 received Trans scleral cryo treatment. Thirty-two (12.74%) eyes out of 94 eyes that received intravitreal chemotherapy were retained with some vision; the remaining 62 eyes were later enucleated. None of the eyes were treated with exenteration as stage 3 eyes first underwent neoadjuvant chemotherapy which reduced the tumormass, followed by enucleation, and finally, radiotherapy was delivered as per the histology reports. The histology reports of 14 eyes showed optic nerve involvement and so these subjects along with the 10 stage 3 subjects received post-enucleation radiotherapy.

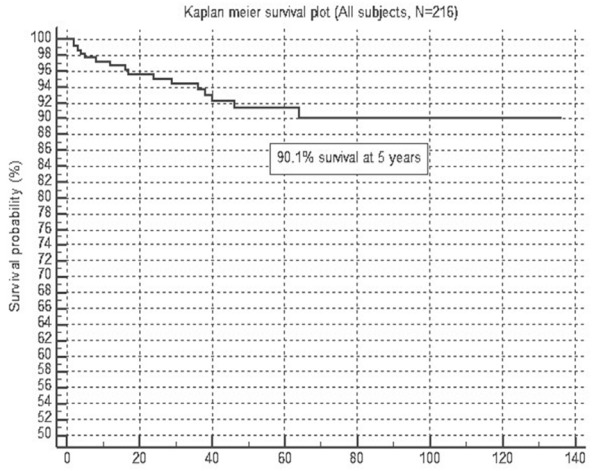
Table 2: Distribution of treatment modality used for treating Retinoblastoma patients

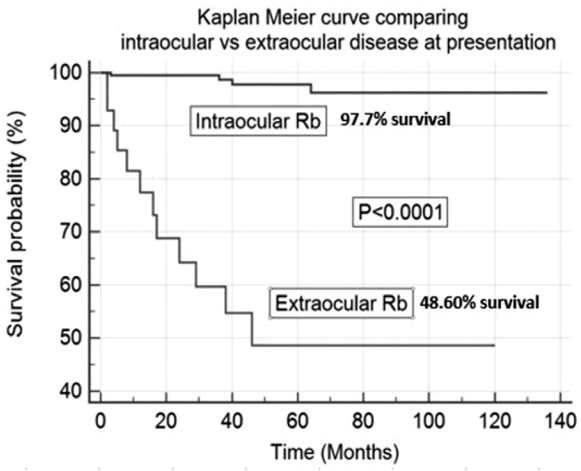
	Cryo/Laser	Intravitreal chemo with enucleation	Intravitreal chemo with retention of eyeball	Enucleation done without local treatment	Total
Systemic chemotherapy given	10	62	32	108	212 (84.46%)
Systemic chemo not given	0	0	0	39	39 (15.54%)
	10	62	32	147	251

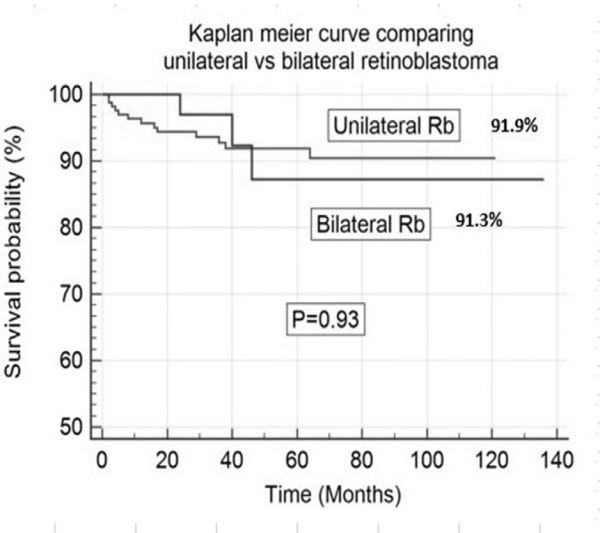
Survival/mortality

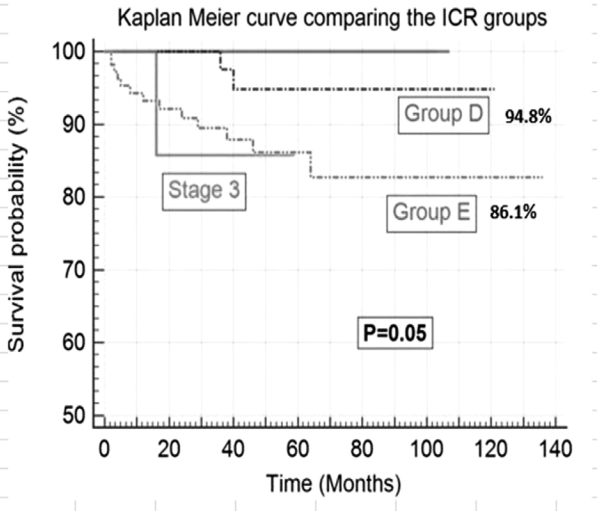
Of 209 subjects, 189 (90.43%) were alive at the time of reporting and two years after treatment had stopped. Survival distribution was 100% among the subjects with unilateral Group A (n=4), and B (n=7) retinoblastoma (ICR). Survival among the groups (ICR) C, D, and E was 94.44% (17 cases) and 95.24% (60 cases), 86.67% (91 cases) respectively. In the patients with stage 3 disease (ICR, orbital metastasis) the mortality was 80% (8cases).

The survival analysis curve (Fig. 2a) depicts 90.1% survival at 5 years (60 Months) for all the subjects combined. The 5-year survival of subjects with extraocular presentation (Stage 3 ICR) was 48.6% in contrast to subjects with the intraocular disease who had 97.7% survival at the same duration (Fig. 2b), (P<0.0001). The 5-year survival of unilateral and bilateral retinoblastoma subjects was statistically similar (P=0.93) being 91.9% and 91.3% respectively (Fig. 2c). The 5-year survival for groups (Worst eye for bilateral cases) A, and B was 100% while for groups C, D, and E it was 93.8%, 92.8%, and 84.0% respectively. The hazard ratio for death due to retinoblastoma was 1.07: 3.49: 5.07 for groups D, E, and stage 3 Retinoblastoma respectively. Thus, the mortality risk increased along with the spread of the disease.

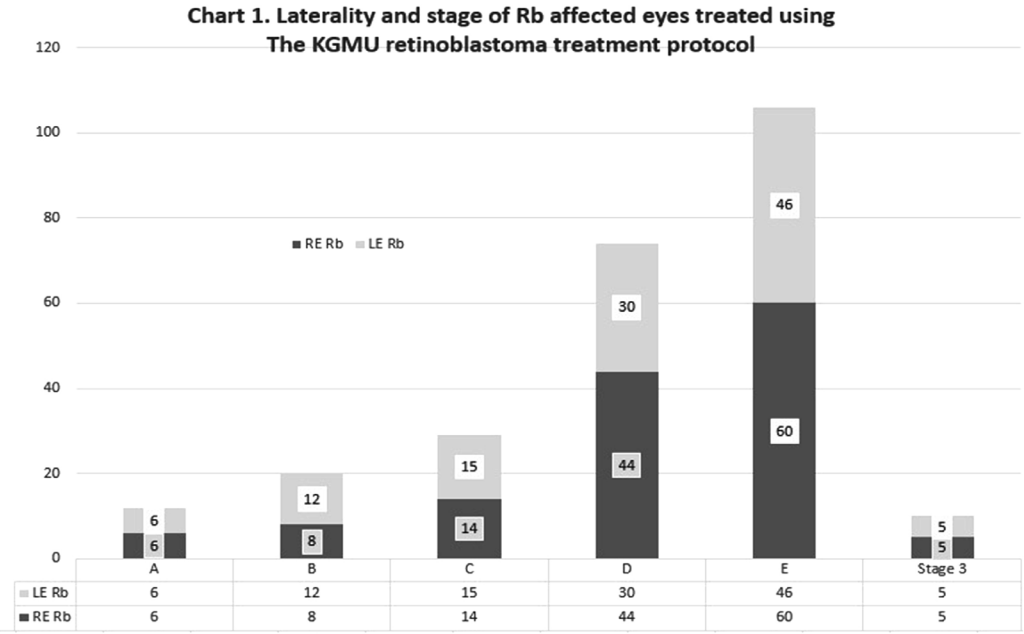








At the time of reporting (follow-up of average 53.22 months, Median 47 months) 189 (90.43%) subjects out of 209 were alive, and out of 251 retinoblastoma-affected eyes 42 (16.73%) were preserved and 32 (12.74% of 251) eyes had a useful vision.



DISCUSSION

The present retrospective study demonstrates the outcomes of the "KGMU retinoblastoma treatment protocol" developed as per the ICR (International Classification of Retinoblastoma) at a tertiary care centre in India. The treatment modalities used were enucleation, LASER photocoagulation, trans-scleral cryo-destruction, intravitreal chemotherapy (Carboplatin 10microgram), systemic chemotherapy as neoadjuvant chemotherapy, and post-surgical radiotherapy as per the protocol. The study highlights the resources needed, outcomes, and survival of subjects with retinoblastoma in a developing country where relatively advanced disease at presentation is common.

We have compared the results from an earlier report from our centre (2009-2015) to reflect upon the improvements in the management of retinoblastoma at our centre compared to this study extending from 2015 to 2022.[1] The average age at presentation reduced from 42 months to 34.2 months, and the latency in reporting after the appearance of the first symptom reduced from 7.0 months (Range 0-88 months) to 5.8 months. There has been a reduced incidence of extraocular presentation, which has reduced from 41% (2009-15) to 3.81% for reasons that have not yet been studied but can be attributed to better awareness and availability of healthcare services. This improvement can be attributed to an improvement in general awareness, socioeconomic status, prompt referral, and improved availability of healthcare resources in our region.

The changes that can be attributed to "the KGMU retinoblastoma treatment protocol" can be seen in the survival proportion of the cases, eye salvage, and vision preservation as mentioned below. Earlier we had an overall survival of 63% compared to 90.43% at present.[1] The eye salvage rate has remained nearly the same 16.2% to 16.73% after implementing the "KGMU retinoblastoma treatment protocol."However, we were able to salvage 12 group C eyes and 1 group D eye with the help of additional intravitreal chemotherapy which was not practiced earlier. When looking at the survival proportion of patients as per the ICR groups, earlier, too, there was no mortality among the patients in groups B and C, like the present report. However, earlier, there was 33.8% mortality among group D, which is now reduced to 5.0%. Similarly, in group E, the mortality was 42.00% which is now 15.38%. Among the subjects with orbital metastasis,

mortality reduced from 48.78% to 25.00%. Thus, the improvement in survival can be attributed to improved management protocol apart from the relatively early presentation during the present report. Eye retention was 100% for groups A & B, 11.1% for group C, and 0% for group D in the earlier report. This has been maintained at 100% for groups A & B and improved to 38.7% for group C, and one eye (1.25%) out of a total of 80 eyes could be saved from enucleation in group D disease. Thus, there has been a significant improvement in the salvage of eyes with retinoblastoma group C (ICR). All the eyes in group E and stage 3 had to be removed to treat the retinoblastoma and no potential for vision in these eyes. None of the eyes needed exenteration, in contrast to 2.4% of eyes that needed exenteration in our previous study. Overall, the globe salvage was 16.73% in our present study.

Comparison to studies from the Indian subcontinent

When we compare this to recent reports from the Indian subcontinent, we find that the median age of retinoblastoma subjects at presentation ranges from 18 to 36 months which is comparable to our median of 32.78 months (Table 2).[3] Although we have included the recent reports from India (2018-2020), still there are differences between the reports from the different geographical areas. Most of the cases were unilateral in the other studies (~60-80% unilateral cases) similar to 78.7% cases with unilateral disease in the present study. One important variable that influences the survival of retinoblastoma subjects is the presence of orbital metastasis of the disease (Stage 3, ICR). In the relevant reports from India, the proportion of orbital metastasis at presentation ranges from 9-58% when compared to our proportion of 3.98%. Another important variable at the presentation that warrants enucleation is advanced retinoblastoma which has destroyed the visual potential of the eye and corresponds to groups D & E (ICR). In our study, this was 71.71% and we enucleated these eyes and a few eyes from group C resulting in enucleation being done in 83.27% of the total eyes affected by retinoblastoma in the present study. In other relevant reports the eyes with advanced intraocular retinoblastoma ranged from 50.1- 85.88% and the eyes which were treated by enucleation ranged from 35-87.5% of eyes affected by retinoblastoma.

The survival in our report is 90.43% and is comparable to Indian reports by Kaliki *et al.* (92%)[9] and Singh *et al.* (97.2%)[11] is better than the reports by Chawla *et al.* (75.7%),[12] and Gupta *et al.* (63%).[1] The survival analysis from the relevant studies is mentioned in only three of the above studies from India. Our survival proportion at 1, 2, 3, and 5 years is 96.6%, 94.9%, 92.2%, and 88.3% respectively, which is better than the reports by Chawla *et al.*.and Gupta *et al.*, and at par with Kaliki *et al.* [1,8,9,12]

The report by Kaliki *et al.* has an overall survival rate of 91% among retinoblastoma patients in south India, and globe salvage was 69%.The globe salvage rate of 69% is higher than our observation of 17.04% however, a globe salvage rate of 69% does not appear feasible as they have reported 68% of the eyes with ICR group D and E disease. The ICR classification defines groups D and E eyes with no visual potential and a high risk of orbital metastasis. Thus, it appears that they have retained 37% of eyes with no visual potential, which is not a logical and safe approach. The study by Bhawna *et al.* published in 2016 reported an overall survival rate of 75.7% and globe retention of 28.2% in north India in retinoblastoma subjects being treated at their centre. These figures though different from our survival rate of 92.5% and globe salvage of 17.04% but are comparable keeping in mind that they had a higher proportion of subjects with orbital metastasis (27.7%) compared to our subjects with orbital metastasis (3.84%), which can explain the higher mortality in their study.

Comparison to countries with similar socioeconomic status

If we compare the present report with the reports from contemporary regions of the world, there are few mentionable recent reports from Pakistan, Tehran, Thailand, Brazil, and China The median age at presentation was lower than in our report (except in Pakistan, 30 months), especially in Thailand where it was 8 months compared to 32 months in our report. The proportion of cases with orbital metastasis was higher than our report (3.84%) in all the studies but reports from Thailand (7.3%) and China (8.7%) were comparable. The globe salvage rate ranged from 4.3%-62.5% compared to our report of 17.04%. The survival of retinoblastoma subjects ranges from 64.5% - 93.8% when compared to our report of 88.4%. Thus, in the Asia pacific geographical area, the presentation and outcomes of our retinoblastoma subjects are comparable to other recent published reports.

There is a relevant publication by the Global retinoblastoma group, which reported a large cohort of retinoblastoma subjects from 149 countries. They have segregated the reports from countries based on per capita income. They have reported the extraocular presentation, globe salvage, and survival from the lower middle-income group countries as 19.7%, 32.9%, and 84.6% respectively. In comparison, we have a favourable incidence of extraocular presentation (3.84%), globe salvage rate (17.04%), and survival proportion (88.4%), which is better than that reported for the bracket in which India falls. Treatment using primary intra-arterial chemotherapy was reported for only 7.5% of all the subjects (Only from higher-income group countries) reported in the study, which points out the paucity and its non-availability in middle-income group countries like India. Intra-arterial chemotherapy is not available at our institute and hence is not included in our protocol either.

Though the outcomes of our treatment protocol are not at par with the developed world, the main reason for this can be attributed to the differences in the epidemiology of retinoblastoma in our region. However, "The KGMU retinoblastoma treatment protocol" has resulted in improvement in the outcomes of retinoblastoma at our centre and is now comparable to the top-tier countries in the middle-income group. The study delineates the requisite resources and the protocol, which can be implemented across the regions with a common healthcare structure. This may provide a basis for the protocol-based management of retinoblastoma in India with designated resources needed to establish centres for prompt treatment and optimum outcomes.

Contribution:

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Original Article

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B-Scan Ultrasonographic Findings in Ocular Conditions with Hazy Media at Tertiary Care Hospital

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Abstract

Aim: The purpose of this study is to evaluate the role of ultrasonography in the diagnosis and management of various ocular pathologies where direct visualization is hindered by hazy media, such as cataracts, corneal opacities, vitreous hemorrhage, and other ocular media disturbances.

Methods: A prospective, descriptive study was conducted on 50 patients presenting with hazy media at a tertiary care hospital. B-scan ultrasonography was performed on all patients to assess ocular pathology that could not be visualized due to media opacity.

Results: Of the 50 patients, the most common ultrasonographic finding was posterior vitreous detachment (28%), followed by retinal detachment (22%), vitreous hemorrhage (16%), asteroid hyalosis (12%, and other findings such as posterior staphyloma (8%) and optic disc drusen (6%). In 8%, no significant abnormality was found.

Conclusions: Ultrasonography is a valuable diagnostic tool in assessing ocular structures in patients with hazy media. It provides critical information for proper diagnosis and management.

Keywords: B-scan Ultrasonography; Posterior segment pathology; Hazy ocular media.

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INTRODUCTION

B-scan ultrasonography is a critical diagnostic tool in ophthalmology, especially for evaluating ocular conditions with hazy media that obscure direct visualization of the eye. Media opacities, such as cataracts, vitreous hemorrhage, or corneal opacities, can make it difficult to assess the retina, optic nerve, and other posterior segment structures. B-scan ultrasonography allows for detailed imaging of the eye's internal structures, enabling the detection of conditions like retinal detachment, intraocular tumors, and foreign bodies.

This modality is invaluable in cases where conventional examination methods fail.

Understanding the B-scan findings in these conditions is essential for accurate diagnosis, treatment, and management of patients with compromised ocular media. This journal will explore the role of B-scan ultrasonography in assessing ocular conditions with hazy media, highlighting its significance in clinical practice.

This study aims to document the ultrasonographic findings in a cohort of patients with ocular conditions associated with hazy media, providing a statistical analysis of the data and drawing conclusions about the utility of ultrasonography in these cases.

MATERIALS AND METHODS

Study Design

A prospective, descriptive study was conducted over 12 months in the Department of Ophthalmology at Navodaya Medical College, Hospital & Research Centre, Raichur, Karnataka. The study included 50 patients who presented with media opacities obscuring direct visualization of the posterior segment.

Ethical Clearance for the study has been obtained from the Ethical Committee of Navodaya Medical College, Hospital & Research Centre

Inclusion Criteria

- Patients with cataract, corneal opacities, vitreous hemorrhage, or other conditions leading to hazy ocular media.
- Patients where a clinical evaluation of the posterior segment was not possible due to media opacity.
- Consent to undergo B-scan ultrasonography.

Exclusion Criteria

- Patients who refused to consent.
- Patients where ultrasonography could not be performed due to ocular trauma or other contraindications.

Procedure

Patients underwent thorough Ocular Examinations for Anterior segment evaluation with

- Visual Acuity
- Fundus Examination with Direct and Indirect Ophthalmoscopes
- Intraocular Pressure with Non Contact Tonometry
- Slit Lamp Biomicroscopy for anterior segment examination and posterior segment details with 90D Lens
- The patients where the posterior segment was difficult to examined due to hazy ocular media were further evaluated with B- Scan Ultrasonography

Each patient underwent a detailed history and clinical examination, followed by B-scan ultrasonography using a 10 MHz transducer. Both axial and transverse scans were performed on the affected eye(s) to assess posterior segment pathology.

Data Collection

Data were collected on demographics, the underlying cause of media opacity, and ultrasonographic findings. Statistical analysis was performed using SPSS software, and the results were presented in percentages and proportions.

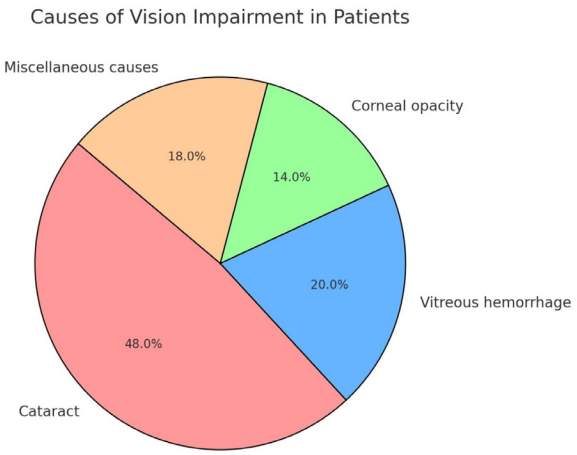
RESULTS

Demographics

The study included 50 patients, with an average age of 61.2 ± 14.6 years. There were 28 males (56%) and 22 females (44%).

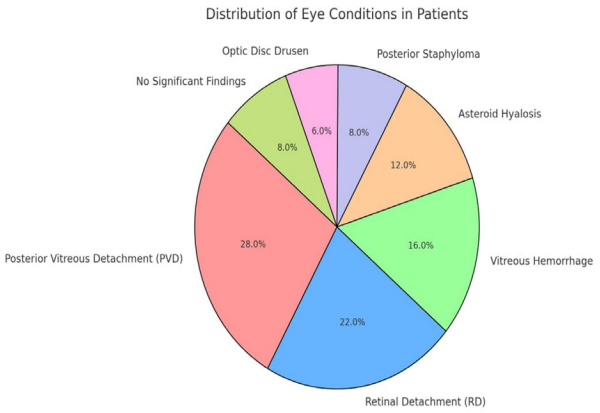
Causes of Media Opacity

- Cataract: 24 patients (48%)
- Vitreous hemorrhage: 10 patients (20%)
- Corneal opacity: 7 patients (14%)
- Miscellaneous causes (including dense posterior capsular opacities, uveitis): 9 patients (18%)



Ultrasonographic Findings

1. Posterior Vitreous Detachment (PVD): 14 patients (28%)
2. Retinal Detachment (RD): 11 patients (22%)
3. Vitreous Hemorrhage: 8 patients (16%)
4. Asteroid Hyalosis: 6 patients (12%)
5. Posterior Staphyloma: 4 patients (8%)
6. Optic Disc Drusen: 3 patients (6%)
7. No Significant Findings: 4 patients (8%)



DISCUSSION

Ultrasonography, especially B-scan, plays a vital role in diagnosing posterior segment pathology when the view is obscured by media opacities. In our study, posterior vitreous detachment and retinal detachment were the most common findings, consistent with existing literature. The detection of conditions like asteroid hyalosis highlights the diagnostic utility of ultrasonography when media opacity limits clinical examination.

- **Posterior Vitreous Detachment (PVD)** was the most frequently observed pathology, affecting 28% of patients. PVD is a common age-related condition, but its clinical significance increases in the presence of vitreous hemorrhage or retinal tears, which can progress to retinal detachment.

» Mohamed *et al.* study posterior vitreous detachment (PVD) 7(19%), and choroidal detachment (CD) 3(8.1%). was detected in in patients with poorly regulated HbA1c and graded either as moderate NPDR; severe NPDR; and proliferative retinopathy (PR).

» In Agarwal R *et al.* study they detected vitreous detachment in 33.33% cases, vitreous band was found in 10.25% cases, Choroidal abnormalities include maximum cases of choroidal detachment (80%), while choroidal hemorrhage was seen in 20%.

» P Sree Lakshmi *et al.* in their study, 71 eyes of 68 patients with vitreous haze and poor retinal visualization were investigated with ultrasound B–scan. Causes for the vitreous haze was due to VH with PVD in 10 eyes, Choroidal detachment in 4 eyes (20%), Posterior scleritis in 4 eyes (20%), choroidal melanoma in 1 eye.

- **Retinal Detachment (RD)** was identified in 22% of cases. Early detection of RD is crucial for prompt intervention, which can prevent permanent vision loss. Ultrasonography allows for the detailed assessment of RD, including the location and extent of the detachment.

» Mohamed *et al.* 1 study partial retinal detachment (PRD) 9(19%) was detected in 100 patient with help of B-Scan.

» In Agarwal R *et al.* study they detected Retinal detachment was the common retinal abnormality detected (41.5%), while retinoblastoma was seen in 5.66 % cases.

» P Sree Lakshmi *et al.* in their study, 71 eyes of 68 patients with vitreous haze and poor retinal visualization were investigated with ultrasound B – scan. Causes for the vitreous haze was due to VH with TRD in 12 eyes, VH with RRD in 6 eyes and VH with peripheral retinal tear in 2 eyes

- **Vitreous Hemorrhage** accounted for 16% of cases. This condition can obscure the retina and make clinical evaluation difficult. B-scan ultrasonography provides valuable information on the extent of the hemorrhage and any associated pathology such as retinal tears or detachments. In Mohamed *et al.*. study Vitreous hemorrhage (VH) 42 (66.6%), was detected in 100 patient with help of B-Scan.

» In Agarwal R *et al.* studymaximum no. of ocular abnormalities studied were of Vitreous (40.2%)

» P Sree Lakshmi *et al.* in their study, 71 eyes of 68 patients with vitreous haze and poor retinal visualization were investigated with ultrasound B – scan. Causes for the vitreous haze was due to vitreous hemorrhage in

45 (63%) eyes, inflammatory floaters in 20 (28%) eyes and dense degenerative floaters in 6 (9%) eyes

» Asteroid Hyalosis was found in 12% of cases. This condition is characterized by calcium-lipid deposits within the vitreous body. Although it is usually benign and asymptomatic, in some cases, it may contribute to visual disturbance or be confused with other pathologies like vitreous hemorrhage. Ultrasonography is an excellent tool to differentiate asteroid hyalosis from other vitreous abnormalities.

» Mohamed *et al.* l study asteroid hyalosis (AH) 12(14.3%)was detected in 100 patient with help of B-Scan.

» P Sree Lakshmi *et al.* in their study, 71eyes of 68 patients with vitreous haze and poor retinal visualization were investigated with ultrasound B – scan. Causes for the vitreous haze was due to Asteroid hyalosis in 3 eyes.

- **Posterior Staphyloma** was accounted in 8% cases. Its an abnormal outpouching of the sclera at the posterior pole of the eye, often associated with conditions such as high myopia. It results in the thinning and stretching of scleral tissue, leading to potential visual problems. Important precautions should be taken when patients with Posterior Staphyloma are taken for cataract surgery, such as precaution while giving Ocular Anesthesia, consideration specialized surgical techniques or devices if the staphyloma significantly affects the anterior segmentor lens positioning.

» P Sree Lakshmi *et al.* in their study, 71eyes of 68 patients with vitreous haze and poor retinal visualization were investigated with ultrasound B – scan. Causes for the vitreous haze was due to Posterior staphyloma in 2 eyes.

In 8% of patients, no significant abnormality was detected on ultrasonography. This highlights the utility of ultrasonography as a confirmatory tool, helping to rule out serious pathologies when the clinical presentation is unclear due to media opacity.

- Gupta, P. Chhabra *et al.* demonstrated that ultrasonography is crucial for detecting retinal detachments, vitreous hemorrhage, and intraocular masses in cases of dense cataracts and vitreous opacities. It showed a diagnostic accuracy of 93% when compared with post-surgical findings, emphasizing its reliability for surgical planning.
- S. Ramesh, M. Singh concluded with the research focused on eyes with conditions like dense cataracts and vitreous hemorrhage, showing that B-scan ultrasonography successfully identified retinal detachments and choroidal masses. The results highlighted its role in guiding timely interventions in 85% of the cases studied.
- J. Lee, K. Park *et al.* reported a 90% accuracy rate in diagnosing vitreous hemorrhage, retinal detachment, and choroidal melanoma in patients with advanced cataracts and corneal scars. They highlighted that ultrasonography is indispensable in planning surgeries and determining the prognosis of the condition.

CONCLUSION

Ultrasonography, particularly B-scan, is an indispensable tool for assessing posterior segment pathology in patients with hazy ocular media. It provides crucial information for the diagnosis and management of conditions such as posterior vitreous detachment, retinal detachment, vitreous hemorrhage, and asteroid hyalosis. This study emphasizes the need for routine ultrasonographic evaluation in cases where clinical examination is compromised by media opacity.

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Short Communication

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Short Article on Cartaract

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Abstract

Cataracts are a leading cause of visual impairment globally, accounting for significant cases of blindness, especially in older populations. This paper explores the pathophysiology of cataracts, delves into risk factors and diagnostic methods, and highlights advances in surgical and pharmacological treatments. Emerging therapies and preventive strategies are also discussed, offering insights into future directions in cataract management

INTRODUCTION

Cataracts refer to the clouding of the eye's natural lens, leading to vision impairment. The condition primarily affects the elderly, with prevalence increasing with age. The World Health Organization (WHO) estimates that cataracts account for nearly 51% of blindness worldwide. While age-related cataracts are most common, factors like genetics, trauma, and environmental exposures contribute to the disease's onset.

Pathophysiology

Cataracts develop due to the accumulation of protein clumps in the eye's lens, leading to a decrease in light transmission to the retina. The lens, normally transparent, gradually becomes opaque. Key molecular mechanisms include oxidative stress, protein glycation, and disruption of the lens's microarchitecture. Genetic predisposition, particularly mutations affecting crystallin proteins, also play a crucial role.

Types of cataracts include:

1. **Nuclear cataracts –** Affect the center of the lens, common in aging.
2. **Cortical cataracts –** Begin in the lens's outer cortex, leading to spokes or streaks.
3. **Posterior subcapsular cataracts –** Affect the back of the lens, commonly associated with steroid use and diabetes.

Risk Factors

The primary risk factor for cataracts is aging. Other significant contributors include:

- Genetic predisposition
- Diabetes mellitus
- Prolonged exposure to ultraviolet (UV) radiation
- Smoking and alcohol consumption
- Use of corticosteroids
- Previous eye injury or surgery

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Diagnosis

Early detection of cataracts is crucial for effective management. Diagnostic methods include:

1. **Visual acuity tests:** To assess the degree of vision loss.
2. **Slit-lamp examination:** Provides a detailed view of the lens and other eye structures.
3. **Retinal examination:** Using ophthalmoscopy, the retina is examined after pupil dilation.
4. **Tonometry:** Measures intraocular pressure to rule out conditions like glaucoma that may coexist with cataracts.

Treatment

The primary treatment for cataracts is surgical removal of the cloudy lens, followed by implantation of an artificial intraocular lens (IOL). Techniques include:

- **Phacoemulsification:** The most common method, involving ultrasound waves to emulsify the cataract, which is then aspirated.
- **Extracapsular cataract extraction (ECCE):** In cases where the cataract is too dense for phacoemulsification, a larger incision is made to remove the lens.

Post-surgical outcomes are typically excellent, with over 95% of patients experiencing improved vision. Innovations in IOLs, such as multifocal and accommodating lenses, provide enhanced vision quality.

Advances in Non-Surgical Management

While surgery remains the gold standard, ongoing research into pharmacological treatments is promising. Investigations focus on the use of antioxidant eye drops and compounds like lanosterol, which have shown potential in reversing protein aggregation in the lens.

Prevention Strategies

Preventive measures include managing risk factors such as UV protection through sunglasses, controlling systemic diseases like diabetes, and maintaining a healthy diet rich in antioxidants. Regular eye check-ups, especially for individuals over 60, are recommended to detect cataracts early.

Emerging Research and Future Directions

Current research is exploring gene therapy, nanotechnology, and advanced imaging techniques to improve cataract management. Innovations in lens technology, including accommodating and light-adjustable IOLs, are shaping the future of cataract surgery.

CONCLUSION

Cataracts remain a major cause of visual impairment worldwide. Although surgery is highly effective, ongoing research into non-invasive treatments and preventive strategies could revolutionize cataract care. Early diagnosis, coupled with emerging technologies, will continue to improve patient outcomes and reduce the global burden of cataracts.

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