ORIGINAL ARTICLE

Role of B-Scan Ultrasonography in Cataract Patients; A Single Centered Cross-Sectional Study

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ABSTRACT

Objective: To assess lesions of the posterior segment in pre-operative cataract patients using B-Scan ultrasonography and to determine various risk factors contributing to posterior segment lesions.

Study Design: A Descriptive Cross-Sectional Study

Place and Duration of the Study: The study was conducted in the Department of Radiology, Sahiwal Teaching Hospital from 10th June 2022 to 10th December 2022.

Materials and Methods: We enrolled 290 cases of cataracts including both genders and all ages, both with and without history of trauma. All cases underwent a B-Scan ultrasound to assess posterior segment pathologies. Patients having congenital lesions and with any history of surgery were excluded from the study. The data was analyzed using SPSS version 25.0. The frequencies and percentages of posterior segment pathologies observed on the B-Scan were calculated. The percentage of various co-morbidities contributing to posterior segmental lesions was also analyzed.

Results: The mean age of the subjects was 36.0 ± 23.2 years. 137 (47.2%) cases were females and 153 (52.7%) were males. Cataract was observed in 253 (87.2%) subjects without any trauma to eye. While studying various risk factors that increase the risk of lesions of the posterior segment, the most common were hypertension (17.5%) followed by diabetes mellitus (16.5%).

Conclusion: We concluded that B-Scan is a valuable and easily available modality to detect posterior segment pathologies in cataract patients.

Key Words: *B-Scan, Cataract, Posterior Segment Pathology, Ultrasound*.

Introduction

A cataract is defined as the cloudiness of the natural lens of the eye that causes blurring of vision. It occurs due to the breakdown of proteins in the lens.[1,2] It is considered to be the main cause of blindness all over the world and is more prevalent among elderly subjects. It contributes to blindness in over 12 million people. [2] It has also been reported to be the leading cause of blindness in 15.2 million cases and also the leading cause of moderate to severe visual impairment in 78.8 million cases.[3] The overall prevalence of cataracts in our country is 7.41 % with almost 19.43 % cases being pre-senile cataracts.[4]

Cataract affects the quality of life of patients as it causes disturbances with vision. Currently, surgery is the only option to get rid of cataracts with a good rate of success. The vision is restored by replacing the opaque natural lens of the eye with an artificial lens.[5] Cataract surgery is crucial to avoid secondary complications of cataracts such as glaucoma and it also improves the quality of life of patients.[6]

Ophthalmologists require detailed evaluation before proceeding with surgical procedures. Imaging modalities are of great value in this regard. Different imaging techniques are available to assess the supporting structure of lenses and to evaluate pathologies of posterior segments in pre-operative cataract patients. Among them, B-Scan ultrasonography is a simple and readily available modality.[7]

Different posterior segment lesions that can be seen on B-Scan include retinal detachment, vitreous hemorrhage, posterior vitreous detachment, intraocular foreign body, posterior staphyloma, etc. The pre-operative identification of significant posterior segment lesions timely impacts the post-operative prognosis of vision as well as helps to modify the surgical strategies. Furthermore, B-Scan

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is a non-invasive and cost-effective technique, it can be used over the course of treatment to evaluate the response to treatment.[8]

A significant research gap exists in current literature regarding the evaluation of posterior segment pathologies using non-invasive B-Scan ultrasonography. Moreover, the effectiveness of anterior segment surgeries can be compromised due to untreated posterior segment lesions and no data has been reported from our region regarding the efficacy of B-Scan in evaluating posterior segment lesions in pre-operative cataract patients. So, we planned this study to determine the efficacy of B-Scan to determine posterior segment pathologies in cataract patients as a pre-operative workup and to determine various risk factors that enhance the probability of posterior segment pathologies.

Materials and Methods

This descriptive cross-sectional study was conducted in the Department of Radiology, Sahiwal Teaching Hospital Sahiwal, from 10th June 2022 to 10th December 2022, after the approval from the Institutional Review Board (Sr.No. 12/IRB/SLMC/SWL). The sample size of 290 was calculated using the WHO calculator, taking the prevalence of cataract 7.41 %, keeping confidence interval 95 % and absolute precision 0.05%. The data was collected through a non-probability consecutive sampling technique. The inclusion criteria of our study were patients of both genders, all age groups, and both with and without a history of trauma. Patients having congenital lesions and with any history of surgery were excluded from the study. The informed consent was taken, and their B-Scan ultrasound was performed using an e-Esaote Mylab twice ultrasound machine equipped with a real-time linear high-frequency probe of 7-12 MHZ by consultant Radiologist having completed postgraduation. B.Scan images were obtained in all sections such as axial, coronal, and sagittal. The data was analyzed using SPSS version 25.0. Frequencies and percentages of posterior segment pathologies observed on the B-Scan were calculated. The percentage of various co-morbidities contributing to posterior segmental lesions was also analyzed.

Results

The mean age of our subjects was 36.0 ± 23.2 years. In our study, 137 (47.2%) cases were females and 153 (52.7%) were males as shown in Figure 1 (a). In our study, 253 (87.3%) subjects developed cataracts without any prior history of trauma while only 37 (12.7%) cases had a history of trauma as shown in Figure 1 (b).

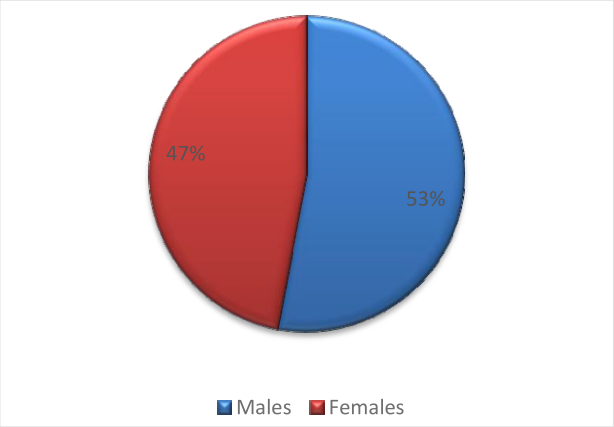

Fig 1 (a): Gender Distribution

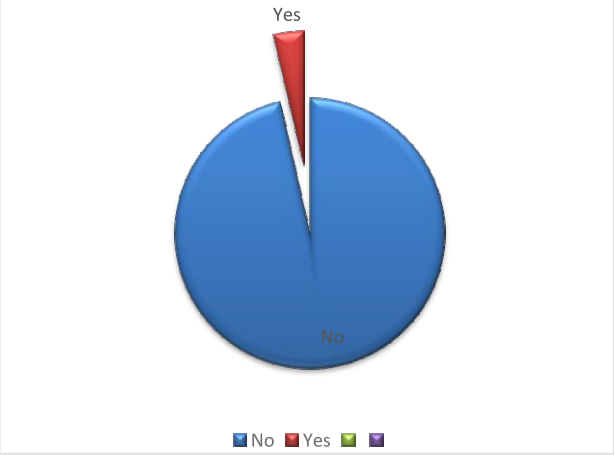

Fig 1(b): Distribution of Patients According to History of Trauma to Eye

Regarding risk factors contributing to pathologies of the posterior segment, 48 (16.5%) patients had diabetes mellitus, and hypertension was present in 51 (17.5%) cases, while only 4 (3.79 %) patients were smokers as shown in Figure 2.

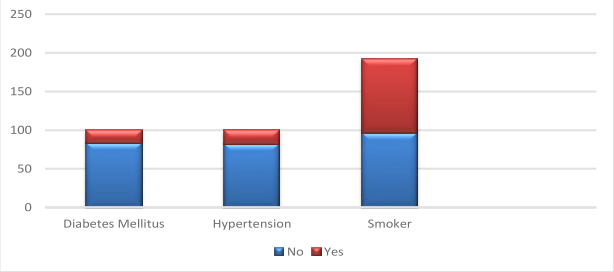

Fig 2 :Risk Factors contributing to Posterior Segment Lesions

The most common posterior segment pathology found in this study was vitreous hemorrhage followed by retinal detachment. In contrast, intraocular foreign body and choroidal detachment were the least frequently observed as shown in Table I.

Table I: Distribution of Posterior Segment Lesions (n=290)

Posterior Segment Pathologies	Frequency (n)	Percentage (%)
Retinal Detachment	48	16.7
Vitreous Hemorrhage	54	18.6
Posterior Vitreous Detachment	20	6.9
Posterior Staphyloma	17	5.9
Intraocular Foreign Body	11	3.9
Choroidal Detachment	11	3.9

Discussion

The findings of the study conducted make a remarkable contribution by highlighting efficacy of B-Scan in detecting posterior segment lesions of eye, as it is a non-invasive and cost-effective modality. The mean age our study showed is 36.0 $\pm$ 23.2 years which coincides with previous literature as shown by a study by Mencucci R *et al.,*[9] that the incidence of cataracts increases with growing age.

Our study demonstrated more males being affected by cataracts and posterior segment lesions, which is in contrary to the findings of a study by Prasad M *et al*.,[10] that showed a higher incidence of cataracts and blindness among females.Some other studies[11,12] also demonstrated more burden of cataracts among females.

The number of patients developing cataracts following trauma in our study was minor (12.7%). A study by Günaydın, NT *et al*.,[13] demonstrated the majority of traumatic cataracts were seen in children. Another study by Trivedi RH *et al*.,[14] showed that posterior capsule opacification is more commonly found in patients developing cataracts after trauma.

Our study successfully demonstrated the key risk factors that contribute to the development of lesions of the posterior segment in cataract patients that will provide valuable insight for clinicians to detect at risk patients before they contribute to more serious complications. These included diabetes mellitus, hypertension, and smoking. A study conducted in Lahore by Taseer Z *et al*.,[15] also demonstrated these as a potential factor in the development of cataract.

Our results showed the most common lesion of the posterior segment to be vitreous hemorrhage followed by retinal detachment. A study by Ullah MA *et al*.,[7] found retinal detachment to be the most commonly found posterior segment pathology followed by vitreous hemorrhage and posterior vitreous detachment. This indicates that clinicians must be aware of most common lesions while assessing the patients in our region.

A study by Chaudhury M *et al*.,[16] concludes B-Scan is of great utility in assessing posterior segment pathologies in pre-operative cataract patients. Another study by Gareeballah A *et al*.,[17] demonstrated posterior vitreous detachment to be the most common pathology of the posterior segment that they found in their patients followed by vitreous hemorrhage. Pre-operative identification of vitreous hemorrhage is crucial as presence of hemorrhage can complicate surgery, and knowing about it beforehand allows surgeons to adjust their techniques accordingly, thus potentially improving surgical outcomes.

In a study carried out in Saudi Arabia by Parrey MU *et al*., [18] among various posterior segment lesions detected, 6 % of cases showed retinal detachment, vitreous hemorrhage was detected in 5.3 % of cases, and posterior vitreous detachment in 1.3 % of cases. A study conducted by Shakour MA *et al.,* [19] demonstrated pathologies in the posterior segment of the eyes in 47.63 % of cases with vitreous abnormalities being most common (46.2%) and retinal detachment being least common (1.3 %).

Limitations of the Study

Certain senile changes such as retinal vein occlusion, macular degeneration, and glaucomatous changes in patients with cataracts could not be assessed which may contribute to suboptimal improvement in visual acuity after surgery. More studies recruiting many patients to evaluate the usefulness of the B-Scan in pre-operative assessment of cataract patients should be carried out.

Conclusion

Our study concluded that B-Scan is a simple, cheap, and easily available modality that helps surgeons in the pre-operative assessment of cataract patients to detect posterior segment pathologies.

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CONFLICT OF INTEREST

Authors declared no conflicts of Interest.

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DATA SHARING STATMENT

The data that support the findings of this study are available from the corresponding author upon request.

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