

ROLE OF OCULAR ULTRASOUND BEFORE CATARACT SURGERY

Salam Geddoa^{1*}, Ali Alhellaly² and Dhia Alghazali³

¹ Radiologist At Al-Hussain Medical City, Karbala.

² Ophthalmologist At Al-Hussain Medical City, Karbala.

³ Radiologist At Al-Hussain Medical City, Karbala.

*Corresponding Address:- Salam73g@Yahoo.Com

ABSTRACT

Cataract is a treatable cause of blindness. A good post-operative outcome can be achieved with appropriate evaluation of unsuspected posterior segment disorders before the surgery by B scan Ultrasonography evaluation. This study assess use B- scan ultrasonogram to visualize status of posterior segment of eye glob, hidden disorders and their percentage that affect the prognosis outcome of cataract surgery. A prospective study was done at the radiological department, using B -scan ultrasound examination of 151 patient candidates for cataract surgery, characterized as 128 patient of non-traumatized and 23 patient with a history of trauma for more than one month. Out of 151 patient, there was 38 patient (25.1%) with abnormal posterior segment disorders. In the non-traumatic group, out of 128 patient, there are 23 patients (17.96%) with abnormal posterior segment disorders. In the traumatic group, out of 23 patient, there are 15 patients (65%) of the abnormal posterior segment. The highest posterior segment disorder in non-traumatic cataract was retinal detachment of 10 patient (43.47%) and at traumatic patient of retinal detachment of 5 patient (33.33%) and vitreous body haemorrhage of 5 patient (33.33%). For patients with systemic risk factors as diabetes mellitus and hypertension, the most frequent lesion was vitreous haemorrhage. In conclusion B-scan ultrasonogram is highly valuable, sensitive and specific, and widely available for detection of posterior segment disorders and its recommended to be a routine examination before the cataract surgery.

Keywords: B-Scan ultra-sonogram, Cataract, Posterior Segment lesions, surgery.

How to cite :

Salam Geddoa, Ali Alhellalyand, and Dhia Alghazali. Role of ocular ultrasound before cataract surgery. *Int J Med sci*, 2022;2(1):32-38

INTRODUCTION

Cataract is an opacification of any part of the lens regardless of the visual equity leading to poor vision and, with time, cause blindness. (1) Nowadays, the cataract becomes a worldwide problem that affects more than 200 million Peoples and estimated 20 million people with blindness (2). Especially in developing countries where low socioeconomic state and poverty play a role in developing it. (3, 4) Causes, as natural ageing process, medications, diabetes mellitus, hypertension, alcoholism, smoking, history of trauma (5, 6), etc.

The only curative option is surgical treatment. With time, the ophthalmologist found some disappointing outcome of post-cataract surgery (7, 8, 9). The causes were due to a hidden disorder of the posterior segment that has been missed on the first fundoscopic examination due to the opaque media prevent light transmission to see the fundus and retina. B-scan

ultrasonogram (brightness modulation scan) was introduced to the ophthalmic practice in 1973. (10) There was a rapid progression in the development of ultrasound machines, with high-resolution imaging can be achieved, getting the benefit of superficial place of the eye, aqueous chambers and vitreous body has a good acoustic media, with correct results (11, 12, 13).

Using high-frequency probes of 7.5-12 MZH for posterior segment study.(14,15),with contact and dynamic (real-time) imaging, which is essential to differentiate some disorders from each other during eye movement at examination, such as in vitreous detachment, vitreous haemorrhage, choroid detachment, and retinal detachment. (16, 17) Therefore, B- scan ultrasonography gives the surgeon advantage when planning surgery. (18)

Ultrasonounds have widely available in primary centres, secondary centres, at the emergency department, radiological department, and at the ophthalmological department with high sensitivity 97.7% and specificity 80% (19, 20) examination for detection and differentiation of the posterior segment disorders (21, 22) making the diagnosis valuable and confident.

This study aims to assess the usage of B- scan ultrasonogram to visualize status of posterior segment of the eye glob, hidden disorders and their percentage that affect the prognosis outcome of cataract surgery.

PATIENTS AND METHODS

This prospective diagnostic study was done from the second of January 2020 to the first of May 2020, which was conducted at the diagnostic radiology department at Al-Hussain Medical City - Karbala. We performed a diagnostic B-scan ultrasonogram on 151 mature cataract patients who are a candidate for cataract surgery.

The included patient was candidates for cataract surgery at any age, regardless of gender. Patients having already posterior segment lesions, those who had an earlier history of ocular surgery and recent trauma of month or less, were excluded from the study.

Institutional ethical clearance was taken from the research ethics committee at Karbala health directorate. Further, verbal consent was obtained from each patient after explaining the benefit to the patient outcome and aims of the study with assuring the confidentiality of patient's names and information. The patient was clinically examined by an ophthalmologist (by slit lamp and fundoscopy) and diagnosed as a case of mature cataract with an impossible evaluation of posterior segment due to opaque media.

All referred patients from the ophthalmological department to the radiological department were given proper clinical history (about trauma, medications, history of DM and HT, previous surgery at the same eye before the examination, etc.). The procedure was explained to the patient, no need for anaesthesia or sedative, and safe. The examination is done with the supine position of the patient. The patient was instructed to close both eyes to the end of the examination, applied coupling gel over eyelids. The patient was asked to follow the instructions, move the closed eyes accordingly, and at the end of the examination, the excessive gel was wiped out with sterile cotton. B- scan ultrasonogram examination using An ultrasound machine of GE voluson E8 and Philips Affiniti 50G with superficial probes of 7.5-12 MHZ of direct contact. The dynamic study was performed, and GE voluson colour Doppler used as required. (18)

Then the patient was characterised as non-traumatic (128), and those with a history of old trauma (23) both gender were included, and both eyes were examined.

RESULTS

Patient age range from 2-84 years old with an average age of 57.58 years. Male 81 (53.64%), female 70(46.35%) table (1), 128 non-trauma group and 23 trauma group table (2). The right eye of 84 patient 63.32%, left eye of 74 patient 46.83% (notice 7 patient have bilateral cataract seen in a patient with systemic risk factors as DM and HT).

In general, out of 151 patients, 38 (25.1%) patients had posterior segment lesions. Among the traumatic group of 23 patients, 15 (65%) had positive posterior segment lesions, while in the non-traumatic group of 128 patients, only 23 (17.96%) cases had positive posterior segment lesions. The highest posterior segment disorder in non-traumatic cataract was retinal detachment of 10 patient (43.47%) and at traumatic patient of retinal detachment of 5 patient (33.33%) and vitreous body haemorrhage of 5 patient (33.33%). Out of the 38 positive cases at both groups figure (1), 15 (39.47%) had retinal detachment, 4 (10.52%) had posterior vitreous detachment, 11(28.94%) had a vitreous haemorrhage, 2(5.26%) had choroid detachment, 2 (5.26%) were vitreous degenerations and asteroid hyalosis, 2(5.26%) posterior staphyloma and 2(5.26%) intraocular foreign body. The posterior segment disorders in-patient with DM and HT was 9 out of 38(23.68 %).

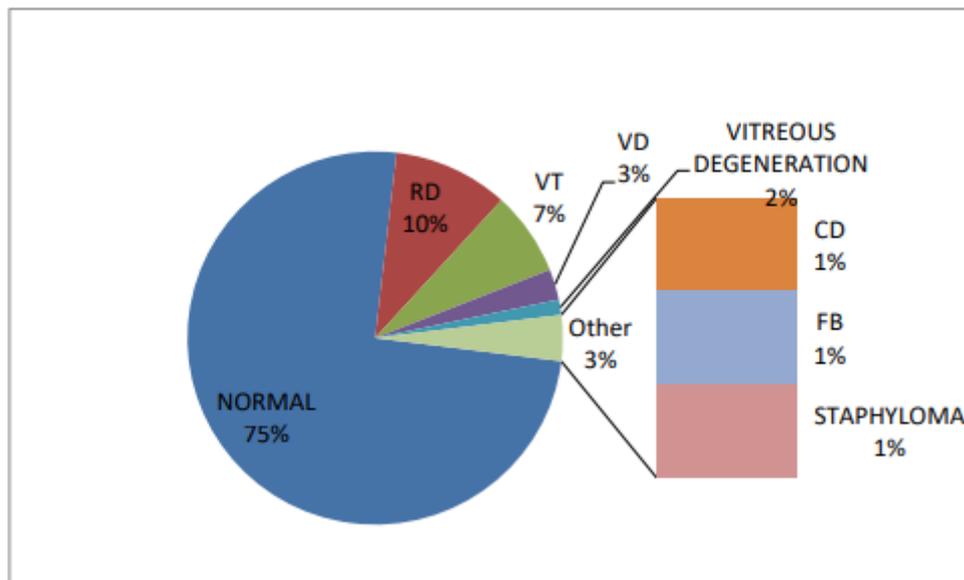


Figure (1) Percentage of posterior segment disorders

Table (1) Age and Sex distribution.

		Non- Traumat Cataract Group	Traumatic Cata Group	Total Patients (151)
Age (Years)	2-10 years	5	2	7
	11-20 years	6	4	10
	21-30 years	8	5	13
	31-40 years	14	7	21
	41-50 years	18	1	19
	51-60 years	25	1	26
	61-70 years	38	2	40
	71-80 years	8	1	9
	More than 80 years	6	0	6
Gender	Male	66	15	81
	Female	62	8	70

Table (2). Ultrasound B-Scan findings.

Posterior Segment Lesions	Non Traumatic Cataract N = 128	Traumatic Cataract N = 23	Total Patients
Retinal Detachment	10(7.81%)	5 (21.73%)	15
Posterior Vitreous Detachment	3(2.34%)	1(4.34%)	4
Vitreous Haemorrhage	6(4.68%)	5(21.73%)	11
Choroid detachment	0(0%)	2(8.69%)	2
Staphyloma	2(1.56%)	0(0%)	2
Asteroid Hyalosis and vitreous body degenerations	2(1.56%)	0(0%)	2
Intra-Ocular Foreign Body	0(0%)	2(8.69%)	2

DISCUSSION

The majority of the patients included in the study, 113(74.83%), have normal posterior segment findings, where the abnormal posterior segment disorders were seen in 38 patient (25.17%). The lesions in non-trauma patients were seen in 23(17.9%) patient out of 128 patient, and in the post, trauma cataract was 15(65.2%) patient out of 23 patient. This overall high percentage was found to be due to the fact of the involvement of both groups. If the groups of the patient separated, the percentage of posterior segment disorders would be closer to the studies done by Other studies done by Kumar et al. (24) was found the percentage

of the abnormal posterior segment in non-trauma patients was 8.5% and in traumatic patients of 64%, and study by Qureshi et al. (25) reported posterior segment lesions in non-trauma patients was 8.64% and in the traumatic patients was 54.4%. Simultaneously, as reported by Mujeeb et al. (26) as 17.3% in the non-trauma patient.

Our study shows retinal detachment was the most frequent disorder in non-trauma patients in 9.9%. It was reported by Mujeeb et al. (26) as 6% and reported by Qureshi et al. (25) as 1.47% in non-trauma patient and 21.12% in traumatic patient. Also, reported by Kumar et al. (19) as 3.4%. In our study, the most frequent disorders in patients with a history of trauma were vitreous haemorrhage and retinal detachment, equally in 21.7% for each.

Staphyloma (27) and vitreous body degenerations were the lowest findings (1.32%) as posterior disorders and are similarly seen in studies of Mujeeb et al. (26). The incidence of abnormal posterior segment was slightly raised more than seen in other studies, maybe because not all patients with cataract were referred for radiological examination, especially cases without risk factors, and patients with trauma have priority for referring. Our study shows that males are affected more than females, which has also been reported in studies done by Lewallen, Courtright. (28)

Patients with systemic risk factors as diabetes mellitus and hypertension show significant posterior segment lesions as vitreous haemorrhage(5),(29), and detachment, affecting both eyes more than once, so it is recommended to check both eyes at each examination.

The highest incidence of posterior segment disorders is seen as patients age increasing.

This is also reported with Mujeeb et al. (26), which goes with the prosthesis of considering cataract as the ageing process. Limitation: the patients referred for B scan ultrasonogram was limited to those with risk factors and those with massive eye trauma, and not all patient shifted for cataract surgery.

CONCLUSION

A significant percentage of posterior segment disorders were detected with a B-scan ultrasonogram before the cataract surgery. It is highly recommended to be used as a routine examination before cataract surgery. This would help in surgical planning and change and improve cataract surgery outcome and meet patient satisfaction. Attention should be paid to cases with a history of trauma and cases of risk factors like diabetes mellitus and hypertension.

REFERENCES:

1. World Health Organization. Action plan for the prevention of avoidable blindness and vision impairment 2009–2013. World Health Organization; [Accessed April 28, 2020]. Available from: http://www.who.int/blindness/ACTION_PLAN_WHA62-1-English.pdf.
2. World Health Statistics 2014, World Health Organization [Accessed April 28, 2020]. Available from: http://apps.who.int/iris/bitstream/10665/112738/1/9789240692671_eng.pdf.
3. services in developing countries. Bull World Health Organ 2002;80:300-3.
4. Gilbert CE, Shah SP, Jadoon MZ, Bourne R, Dineen B, Khan MA, et al. Poverty and blindness in Pakistan: results from the Pakistan national blindness and visual impairment survey. BMJ 2008;336(7634):29-32 .
5. West SK, Valmadrid CT. Epidemiology of risk factors for agerelated cataract. *Survey of Ophthalmology*, 1995, 39: 323– 334.

6. Perry, L. J. The evaluation of patients with traumatic cataracts by ultrasound technologies. In: *Seminars in ophthalmology*. 2012. 27: 121-124.
7. Meyer, J., Murray, N. Evaluation of the World Health Organization outcome standards at the early and late post-operative visits following cataract surgery. *Nepalese Journal of Ophthalmology*. 2020, 12(1), 66- 74. <https://doi.org/10.3126/nepjoph.v12i1.24906>.
8. Zhang X, Li EY, Leung CK-S, Musch DC, Tang X, Zheng C, et al. (2017) Prevalence of visual impairment and outcomes of cataract surgery in Chaonan, South China. *PLoS ONE* 12(8): e0180769. <https://doi.org/10.1371/journal.pone.0180769>.
9. Byrne SF, Green RL. *Ultrasound of the eye and orbit*. Saint Louis, United States of America: Mosby; 2002.
10. Bronson NR 2nd, Turner FT (1973) A simple B-scan ultrasonoscope. *Arch Ophthalmol* 90: 237-238.
11. Mendes MH, Betinjane AJ, Cavalcante Ade S, Cheng CT, Kara-José N (2009) Ultrasonographic findings in patients examined in cataract detection-and treatment campaigns: a retrospective study. *Clinics (Sao Paulo)* 64: 637-640.
12. Javed EA, Chaudhry AA, Ahmed I, Hussain M. Diagnostic applications of B scan. *Pak J Ophthalmol*. 2007;23(2):80-83.
13. Sandinha MT, Kotagiri AK, Owen RI, Green C, Steel DHW. Accuracy of B-scan in acute fundus obscuring vitreous haemorrhage using a standardized scanning protocol and dedicated
14. ophthalmic ultrasonographer. *Clin Ophthalmol* 2017;11:1365-1370. Kendall CJ, Prager TC, Cheng H, Gombos D, Tang RA, Schiffman JS. Diagnostic ophthalmic Ultrasound for Radiologists. *Neuroimaging Clin North Am* 2015;25(3):327-65).
15. Byrne SF, Green RL. *Ultrasound of the eye and orbit*, 2nd ed. Philadelphia, PA: Mosby, 2002:544.
16. Coleman DJ, Silverman RH, Hondeau MJ, Lloyd HO, Daly S (2006) Explaining the current role of high frequency ultrasound in ophthalmic diagnosis (ophthalmic ultrasound). *Expert Rev Ophthalmol* 1(1):63-76.
17. Zafar D, Sajad AM, Qadeer A. Role of B Scan ultrasonography for posterior segment lesions. *Pak J LUMHS*. 2008;7:7-12.
18. Sharma OP. Orbital sonography with its clinico-surgical correlation. *Ind J Radiol Imag* 2005; 15(4):537-54) , (Perry LJ (2012) The evaluation of patients with traumatic cataracts by ultrasound technologies. *Semin Ophthalmol* 27: 121-124.).
19. *international journal of anatomy, radiology, and surgery*. 2018, Oct. Vol 7(4): RO46-RO51.
20. Garima Rajimwale et al: role of ultraonography in evaluation of pathologies of posterior segment of the orbit (*international journal of anatomy, radiology, and surgery*. 2018, Oct. Vol-7(4): RO46-RO51).
21. Ahmed J, Shaikh FF, Rizwan A, Memon MF. Evaluation of vitreoretinal pathologies using B-scan ultrasound. *Pak J Ophthalmol*. 2009;25:4.
22. Ali SI, Rehman H. Role of B-scan in preoperative detection of posterior segment pathologies in cataract patients. *Pak J Ophthalmol* 1997;13(4):108- 112.
23. Belden CJ, Abbitt PL, Beadiels KA (1995) Color Doppler US of the orbit. *Radiographics* 15(3):589-608.
24. Kumar et al, (role of B-scan in Advanced cataract Patients *IOSR JDMS*, p-ISSN:2279-0861. Volume 17 Issue 4 Ver15(April 2018).
25. Qureshi MA, Laghari K. Role of B-Scan Ultrasonography in pre-operative cataract patients. *Int J Health Sci (Qassim)* 2010 January; 4 (1): 31–7.). Segment Eye Diseases Detected BY B-Scan Ultrasonography In Advanced Cataract., *Indo Am. J. P Sci*, 20219, 06(06). 11261-1266.).

26. Mujeeb et al, Posterior Segment Eye Diseases Detected BY B Scan Ultrasonography In Advanced Cataract., *Indo Am.J.P Sci*, 2019, 06(06). 11261-1266.
27. Ohno-Matsui K, Jonas JB. Posterior staphyloma in pathologic myopia. *Prog Retin Eye Res* 2019;70:99-109.
28. Lewallen S, Courtright P. Gender and use cataract surgical services in developing countries. *Bull World Health Organ* 2002;80:300-3.
29. Mohamed IE, Mohamed MA, Yousef Mahmoud MZ, Alonazi B. Use of ophthalmic B-scan ultrasonography in determining the causes of low vision in patients with diabetic retinopathy. *Eur. J. Radiol. Open*. 2018;5:79-86.