The Role of Preoperative Ultrasonography for Patients With Dense Cataract: A Retrospective Study of 509 Cases

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■ **BACKGROUND AND OBJECTIVE:** Ocular ultrasonography is widely used for the evaluation of eyes with opaque ocular media. Although preoperative ultrasonography of the globe has been recommended for patients with dense cataracts, the value of such an examination is currently unknown. The purpose of this study was to evaluate the prevalence and nature of intraocular pathologies detected by preoperative ultrasound examination in patients with dense cataract.

■ **PATIENTS AND METHODS:** The authors retrospectively studied 509 patients referred for routine ultrasound examination of the globe due to dense cataract. Exclusion criteria included known posterior segment pathology, previous ocular surgery or penetrating trauma, and age of younger than 18 years. All the patients underwent ultrasound examination by B-scan and standardized A-scan.

■ **RESULTS:** In 19.6% of the patients, a posterior segment pathology was revealed by the ultrasound examination. The most frequently disclosed abnormalities were posterior staphyloma (7.2%), retinal detachment (4.5%), and vitreous hemorrhage (2.5%). One patient with a large choroidal malignant melanoma was identified. The prevalence of posterior segment pathologies was slightly higher in patients with a history of ocular trauma, compared with the nontraumatic cataract group (29.6% versus 19.0%, respectively; $P = .1$).The prevalence of retinal detachment was increased in the traumatic cataract subgroup (14.8% compared with 3.9%), but this difference did not reach statistical significance.

■ **CONCLUSION:** Preoperative ultrasound examination for patients with dense cataract can be used to detect pathologies that may influence the surgical strategy and the postoperative visual prognosis.

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INTRODUCTION

Ocular ultrasonography has become an indispensable tool in ophthalmology. In the past decade, its use has expanded to encompass biometric calculations, tissue characterization, evaluation of intraocular tumors, and assessment of orbital and optic nerve diseases.[1–4] The evaluation of eyes with opaque ocular media is one of the primary indications for the use of ocular ultrasonography.[5–7] Furthermore, the incidence of concurrent intraocular findings, such as retinal detachment or malignant melanoma, has been shown to be increased in eyes with opaque media.[8,9] Therefore, preoperative ultrasonography of the globe has been rec-

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TABLE 1
Posterior Segment Abnormalities Detected by Preoperative Ultrasound

Abnormality	No. of Patients	Percentage of Total Patients	Percentage of Patients With Positive Findings
Posterior staphyloma	37	7.2	37
Retinal detachment	23	4.5	23
Vitreous hemorrhage	13	2.5	13
Optic nerve cupping	6	1.2	6
Age-related macular degeneration	6	1.2	6
Epiretinal membranes and PVR	3	0.6	3
Elevated optic disc	3	0.6	3
Intraocular foreign body	2	0.4	2
Optic nerve coloboma	2	0.4	2
Optic nerve drusen	2	0.4	2
Choroidal malignant melanoma	1	0.2	1
Choroidal osteoma	1	0.2	1
Asteroid hyalosis	1	0.2	1

PVR = proliferative vitreoretinopathy.

ommended prior to cataract extraction when the fundus cannot be visualized.[2,10-12]

The value of ultrasound examinations in patients with dense cataract is currently unknown. The purpose of this study was to evaluate the prevalence and nature of intraocular pathologies detected by preoperative ultrasound examination in patients with dense cataract.

PATIENTS AND METHODS

We retrospectively reviewed the charts of 509 consecutive patients (509 eyes), referred for ophthalmic ultrasonography before cataract extraction between 1985 and 1995. The ultrasound examination was routinely performed when dense cataract precluded the visualization of the fundus. Exclusion criteria included a previous history of ocular surgery or penetrating trauma, known posterior segment pathology, or age younger than 18 years.

All the patients were examined by standardized A- and B-scan echography by one of us (IIA or EZB). This ultrasound, commonly used for diagnostic ultrasonography of the posterior segment, has an 8-MHz transducer and a resolution of approximately 0.2 mm. The ocular findings were documented by photography, and these photographs were reviewed for the purpose of this study. The clinical data were retrieved from the hospital charts. Data are presented as the mean plus or minus the standard deviation, and the results were analyzed using the Student's *t* test, with a probability of less than .05 determined as significant.

RESULTS

Two hundred thirty-seven men and 272 women were included in the study. The mean age of the patients was 66.6 ± 14.5 years (range 19–96 years). In 100 (19.6%) of the 509 patients, a posterior segment pathology was identified by the ultrasound examination. The pathologic findings that were depicted by ultrasound examination are shown in Table 1. The most frequently disclosed abnormalities were posterior staphyloma, retinal detachment (either partial or total), and vitreous hemorrhage. We detected one case of choroidal malignant melanoma, that later was presumed to be the cause of the cataract.

The average age of the patients with abnormal ultrasound findings was 65.2 ± 15.6 years. This was not significantly different from the age of the remain-

TABLE 2
The Distribution of Ocular Findings Detected by Preoperative Ultrasound Examination

Ocular Finding	Nontraumatic Cataract (n = 482)		Traumatic Cataract (n = 27)	
	No. of Patients	Percentage	No. of Patients	Percentage
Posterior staphyloma	37	7.6	0	0
Retinal detachment	19	3.9	4	14.8
Vitreous hemorrhage	12	2.5	1	3.7
Optic nerve cupping	6	1.2	0	0
Age-related macular degeneration	6	1.2	0	0
Elevated optic disc	3	0.6	0	0
Intraocular foreign body	0	0	2	7.4
Epiretinal membranes and PVR	1	0.2	1	3.7
Optic nerve coloboma	2	0.4	0	0
Optic nerve drusen	2	0.4	0	0
Choroidal malignant melanoma	1	0.2	0	0
Choroidal osteoma	1	0.2	0	0
Asteroid hyalosis	1	0.2	0	0

PVR = proliferative vitreoretinopathy.

ing patients. The male-to-female ratio was also not significantly different from that of the remaining patients (0.8 versus 1.1, respectively).

To correlate the ultrasonographic findings with ocular trauma, we divided the patients into two subgroups: (1) patients with a history of blunt ocular injury (27 of 509 patients; 5.3%), and (2) patients with no history of ocular trauma (482 of 509 patients; 94.6%). We found subtle differences in the age and sex distribution of the patients. The traumatic cataract patients were somewhat younger than the nontraumatic cataract patients (49.9 ± 17.8 years and 67.4 ± 13.8 years, respectively). In addition, there was a male preponderance in the traumatic cataract group, with a male-to-female ratio of 2.4, compared with 0.8 in the nontraumatic cataract patients.

The incidence of posterior segment pathologies discovered by ultrasound examination was slightly higher for patients with a history of blunt trauma compared with the nontraumatic cataract group (8 of 27 [29.6%] versus 92 of 482 [19.0%], respectively; $P = .1$). We compared the pathologies observed by ultrasound examination between patients with traumatic versus nontraumatic cataract (Table 2). Although the rate of retinal detachments was higher in the traumatic cataract group (14.8% versus 3.9%), it did not reach statistical significance. Unexpectedly, intraocular foreign bodies were found in two patients of the traumatic cataract group.

DISCUSSION

In 19.6% of the eyes examined by preoperative ultrasound, a posterior segment pathology was identified. Posterior staphyloma, observed in 7.2% of the patients, was the most common pathology. This finding is of major importance for selecting the mode of anesthesia for the planned cataract surgery. Posterior staphyloma raises the risk for globe perforation during retrobulbar anesthesia.[13,14] Therefore, alternative modes of anesthesia should be considered for these patients. Although myopia or elongated axial eye length can be diagnosed by means other than preoperative standardized echography, the presence and extent of a coexistent posterior staphyloma is best determined by ultrasound examination. In addition, the concurrence of neovascular maculopathy in eyes with posterior staphylomas can be accurately characterized and outlined by B-mode echography,[15] and this is valuable when predicting the postoperative visual prognosis.

Retinal detachments were delineated in 4.5% of our patients. Both tractional, rhegmatogenous and mixed types of retinal detachments were identified. This information is crucial for the planning of cataract extraction. A retinal detachment may be long-standing, thus conveying poor visual prognosis. Therefore, patients may be referred to a retina specialist for further evaluation before a decision regarding surgery is made. Furthermore, these patients should be informed of the reduced chances of improving their vision after surgery due to the complexity and nature of the retinal detachment.

Unsuspected intraocular malignancy was detected in one patient. The patient was a 49-year-old woman with unilateral cataract and a large choroidal malignant melanoma in direct contact with the lens. We presume that the melanoma was the cause for the opacification of the lens. The asymmetric presentation of the cataract and the age of the patient are characteristic of a tumor-associated cataract.

Choroidal malignant melanoma associated with dense cataract has been previously reported.[8,11,16,17] Shields et al.[11] described 21 patients with uveal malignant melanoma that was discovered after the removal of a unilateral cataract. These cases comprised 3.2% of the patients with melanoma referred to their tumor clinic. Chess et al.[16] described 4 patients with choroidal malignant melanoma detected 6 months after cataract surgery. None of their patients had been examined by preoperative ultrasound, and the melanoma was detected by direct visualization after the cataract extraction. In a series of 650 eyes with posterior uveal melanoma examined at the Armed Forces Institute of Pathology, 31 eyes had undergone previous cataract surgery.[17] In none of these cases had B-scan ultrasonography been performed; however, in 52.7% of the patients, the diagnosis of malignant melanoma was made within 1 year after cataract extraction. In the majority of the patients, the tumor was large enough to be identified at the time of surgery. The incidence of malignant melanoma in patients undergoing cataract extraction for unilateral cataract, as reported in these studies, supports the role of preoperative ultrasound examination for these patients.

The prevalence of abnormalities discovered by ultrasound examination was somewhat higher in the traumatic cataract patients compared with the patients without previous history of ocular injury. In 14.8% of the traumatic cataract patients, a retinal detachment was identified. All of these retinal detachments were total, had a funnel shape, and exhibited ultrasound characteristics compatible with long-standing detachments. Ocular trauma may therefore be associated with posterior segment pathology in patients with dense cataracts. This emphasizes the need to search for causes for the lens opacification that are not age related. Interestingly, we found an intraocular foreign body in two patients with a previous diagnosis of blunt trauma. The presence of intraocular foreign bodies was later confirmed by computerized tomography.

The prevalence of ocular pathologies in our patients is higher than their prevalence in the normal population. Such an association has previously been described.[9,11,16,17] Patients with dense cataracts may comprise a subgroup of cataract patients that has an increased risk for additional ocular pathologies.

Based on our findings, we recommend for consideration the performance of a preoperative ultrasound examination for patients with dense cataract. This examination enables the diagnosis of pathologies that otherwise may not be identified. The detection of these pathologies can influence the surgical strategy and the postoperative visual prognosis.

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