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OUTCOMES OF CATARACT SURGERY IN BOSNIA AND HERZEGOVINA, ASSOCIATED RISK FACTORS AND THE IMPORTANCE OF PREOPERATIVE OCULAR ULTRASONOGRAPHY

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ABSTRACT:

Objectives: To evaluate cataract surgery outcomes, the causes of poor postoperative visual acuity, and the importance of preoperative ultrasonography in cataract surgery patients.
Design: prospective observational consecutive case study.
Patients and Methods: This prospective cross-sectional study included all patients planned for cataract surgery from January to December 2017. Detailed analysis of preoperative status, surgical and follow-up details was performed. The outcomes were classified as good (≥6/18), borderline, and poor (<6/60). The causes for poor visual outcome were classified as selection, surgery, spectacles, or sequelae. Special attention was given to preoperative ocular ultrasonography.
Results: This study included 1298 cataract surgery patients. Mean age was 67.5±7.7 years and 667 (51.4%) surgeries were performed on female patients. Ocular and systemic comorbidities were found in 331 (25.7%; 95%CI:23.3-28.2) and 930 (71.6%; 95%CI:69.1-74.1) patients. Intraoperative complications were noted in 38 (2.9%; 95%CI:2.1-4.0) patients. Good, borderline, and poor postoperative best corrected visual acuity (BCVA) at the 4 weeks follow-up was found in 925 (93.3%; 95%CI:91.6-94.8), 40 (4.0%; 95%CI:2.9-5.5) and 26 (2.6%; 95%CI:1.7-3.8) patients respectively. Selection was the main cause for BCVA less than 6/18 (83.3%; 95%CI:72.1-91.4), while surgical complications were responsible for 7 (0.7%; 95%CI:0.3-1.4) cases with poor postoperative BCVA. Presence of ocular comorbidities, significant ultrasonography findings as well as the presence of posterior vitreous detachment were associated with poor postoperative BCVA.
Conclusions: This study shows that good postoperative BCVA can be achieved in Bosnia and Herzegovina. A detailed preoperative ultrasonography in eyes with poor visualization may indicate a possible poor postoperative outcome.
Key words: visual acuity; complications; preoperative assessment; B scan.

INTRODUCTION

Cataract presents the leading cause of preventable blindness in the world [1]. Increased life expectancy, with a greater number of aging population, resulted in an increase of cataract prevalence in the world [1-3]. Nevertheless, in most countries cataract surgical coverage is also increasing, with significant improvement in postoperative visual outcomes [2]. However, the burden of cataract is still the highest in developing countries[1] where most of the patients come for surgery with advanced cataract and low vision, which are associated with poor postoperative results [2,3].
Preoperative preparation of cataract surgery patients requires a comprehensive ophthalmic examination in order to detect ocular comorbidities that are likely to affect the outcome [4]. It is estimated that 7.2% of cataract surgery patients with a normal biomicroscopic fundus examination have macular abnormalities that could be identified only by optical coherence tomography (OCT) [5]. However, in settings with limited resources and a significant share of patients with advanced cataracts, ocular ultrasonography may be the only way to gain insight into the condition of the posterior segment of the eye that is planned to undergo cataract surgery [6,7].
The aim of this study was to evaluate the cataract surgery outcomes, causes of poor postoperative visual acuity, and the importance of preoperative ultrasonography in cataract surgery patients.

PATIENTS AND METHODS

This prospective study included all patients from the surgical Department of Ophthalmology of the University Clinical Centre Tuzla admitted for cataract surgery in the period January - December 2017. University Clinical Centre Tuzla is the only tertiary health care institution in Tuzla canton, north-eastern region of Bosnia and Herzegovina performing cataract surgery. Cataract surgery patients go through 2-stop model: one visit at the cataract surgeon for preoperative assessment and one for hospital admission and surgery. Therefore, only patients previously examined by the cataract surgeon can be appointed for surgery. As part of preoperative preparation, all patients scheduled for cataract surgery at admission had to provide new laboratory test results and internal medicine specialist findings, both not older than two weeks.

Patients younger than 40, patients with a history of penetrating eye trauma, any type of eye surgery, and patients with known posterior segment pathology were excluded from the study. All included patients underwent ultrasonography examination before the history or examination had been revealed to the masked examiner, in order to minimize any possible bias. Ophthalmic and ultrasonography examinations together with cataract extraction were performed by five ophthalmologists - three experienced cataract surgeons (more than 5000 surgeries) and two resident - young cataract surgeons (more than 500 surgeries).

Standardized echography (UltraScan, Alcon Ltd., Fort Worth, USA) was performed on all patients using 10 MHz probe. Eye drops of 0.5% tetracaine were used for local anaesthesia and hydroxypropyl methyl cellulose as the coupling material. During the examination, the patients were lying comfortably on the bed near the ultrasound machine so that the examiner could see the eye and the monitor at the same time. Initial examination was performed under high gain and it was followed by a lower gain examination for more detailed inspection in various probe positions. Kinetic echography was performed by keeping the ultrasound probe still, while the patient was asked to move his eyes in different gazes in order to determine the movements of membranous structures inside of the eye. Special attention was given to the evaluation of the vitreo-retinal interface and the presence of posterior vitreous detachment (PVD). Quantitative echography was performed in order to determine the internal reflectivity of solid lesions.

Significant posterior segment pathology on ultrasonography was defined as it was likely to affect the postoperative visual result. These changes included retinal detachment (with or without macular involvement), vitreous haemorrhage, dense vitreous opacities and proliferations, large cupping of the optic nerve head, posterior staphyloma, retinal thickening in the macular region, and choroidal coloboma. Visually significant vitreous opacities were considered as those remaining visible after gain reduction to 70dB. All findings were documented and reviewed for this study. After B scan echography, all patients underwent A scan biometry for intraocular lens (IOL) calculation and the target postoperative refractive error was 0 dioptres (D).

Upon completing the ultrasonography examination, the patient underwent a complete ophthalmic examination, including visual acuity (VA) testing with Snellen charts, tonometry, detailed slit lamp biomicroscopy examination, pupillary reaction and fundoscopy. Cataracts were classified with the LOCS III system using the slit lamp after pupil dilatation with 1% tropicamide [8,9]. A detailed fundus examination was performed with dilated pupils using the slit lamp using a 78 D lens. Poor posterior segment visualization was considered as an obstruction in the visualization of both the macula and optic nerve, with either peripheral or none of the fundus parts being visible, corresponding to values of 4 for cortical and nuclear opacities. Preoperative ocular comorbidities were defined as corneal scaring, old iritis, retinal diseases including diabetic retinopathy, age-related macular degeneration, high myopia, glaucoma, and others.

All patients underwent phacoemulsification (Phaco) or extracapsular cataract extraction (ECCE) in local peribulbar anaesthesia. The patients were designated for ECCE in cases of hard cataracts with corneal dystrophy or loose zonules, and in cases where patients could not afford Phaco. Standard Operating Procedures (SOP) and definitions specified in the World Health Organization (WHO) Manual for Monitoring Cataract Surgical Outcomes (MCSO) were followed. All data was entered in the WHO recommended cataract surgical record (CSR) form and analysed [10]. The used intraocular lenses (IOLs) were either posterior chamber (PCIOL) or anterior chamber (ACIOL) ones. The use of ACIOL was indicated when capsular support for placement of the PCIOL posterior to the iris was deficient due to capsular tear or zonular damage. All details about date, operator, type of operation, type of IOL, possible intraoperative, and postoperative complications were recorded.

Postoperative care included antibiotic-steroid combination eye drops 6 times a day for 3 weeks. Postoperative follow-up included complete ophthalmic examination 1 day, 1 week, and 4 weeks after the cataract extraction, depending on patients' abilities. Control examinations 1 week and 4 weeks after the surgery included measurement of the presenting (uncorrected) and best corrected visual acuity (BCVA), intraocular pressure measurement, and slit-lamp examination of the anterior eye segment as well as the slit-lamp biomicroscopy of the posterior eye segment. After uncorrected VA was determined, BCVA was measured by Tomey RT-7000 Auto Refractor Keratometer (Tomey Corporation, Nagoya, Japan) and later manually corrected with appropriate glasses. According to WHO guidelines, BCVA was categorized as: good (6/6-6/18), borderline (6/24-6/60), or poor surgical outcome (<6/60). If the postoperative outcome was poor, the causes were classified as follows: selection (as a result of preoperative comorbidities such as corneal opacity, glaucoma, retinal or optic nerve pathology), surgery (intraoperative

and postoperative complications including capsule rupture, iridodialysis, zonular dehiscence, residual lens matter, wound leak, severe uveitis, striate keratopathy), spectacles (absent or inadequate postoperative optical correction by IOL or spectacles), and sequelae (late postoperative complications such as retinal detachment, uveitis, secondary glaucoma) [10]. The results of the presenting internal medicine specialist examination were used to determine the presence of systemic comorbidities.

The current study was approved by the University Clinical Center Tuzla Ethics Committee. Written informed consent was obtained from all patients after receiving an explanation of the investigative nature and intent of the study and the tenets of the Helsinki Declaration were followed.

The data were analysed using Stata Statistical Software, version 13.0 (StataCorp LP, College Station, Texas, USA). For statistical analysis, age was categorized into five categories: 40-49, 50-59, 60-69, 70-79, and >80 years of age. All comorbidities and intraoperative complications were categorized as present or absent. Association of risk factors with visual outcomes was evaluated by a logistic regression model and Chi-square or Fisher's exact tests were used for categorical variables. A two-tailed p value of <0.05 was considered statistically significant. Risk factors for poor outcomes were analysed by using univariable and multivariable regressions using data for best corrected visual acuity (BCVA) at 4 weeks follow up [4,10].

RESULTS

This study included a total of 1298 patients meeting the inclusion criteria. Mean age of all included patients was 67.5 ± 7.7 years (range 44 to 91). Female gender was more prevalent 51.4% (667), where 51.5% (669) patients were planned for right eye surgery, evenly distributed in both genders (p=0.126). Good visualization was found in 801 (61.7%; 95%CI:59.0-64.4) eyes planned for cataract surgery, while total of 497 (38.3%; 95%CI:35.0-41.8) had dense corticonuclear or mature cataracts obstructing the posterior segment visualization. Average age of patients with good visualization was lower than in patients with the poor one, 65.2 ± 7.2 and 71.3 ± 7.0, respectively (p<0.000). Preoperative BCVA in the eye planned for cataract surgery was <3/60 in 135 (10.4%; 95%CI:8.7.12.3), 4/60 - 6/60 in 548 (42.2%, 95%CI:38.7-45.9), 6/18-6/60 in 610 (47.0%; 95%CI:43.3-50.9) and >6/12 in 5 (0.4%; 95%CI:0.1-0.9) patients. Preoperative ocular comorbidities included corneal scar in 1 (0.1%, 95%CI;0-0.4), old iritis in 17 (1.3%; 95%CI:0.8-2.1), glaucoma in 42 (3.2%; 95%CI:2.3-4.4), retinal disease in 214 (16.5%; 95%CI:14.3-18.8) and other comorbidities in 57 (4.4%; 95%CI:3.3-5.7) patients. Eight (0.6%; 95%CI:0.2-1.2) patients had the increased values of intraocular pressure more than 25.0 mm Hg before the cataract surgery, and 3 (0.2%; 95%CI:0.0-0.6) patients had hyper-mature cataract. Out of 801 patients with non-mature cataracts, 481 (60.0%; 95%CI:56.6-63.5) had posterior cortical, 211 (26.3%; 95%CI:23.3%-29.0) nuclear, 99 (12.4%; 95%CI:10.2-14.8) posterior subcapsular and 10 (0.1%; 95%CI:0.6-2.3) patients had anterior polar cataract. Systemic comorbidity was present in 930 (71.6%; 95%CI:69.1-74.1) patients, out of which arterial hypertension was in 651 (50.5%; 95%CI:47.4-52.9) patients, hyperlipidemia in 324 (25.0%; 95%CI:22.6-27.4) and diabetes mellitus in 177 (13.6%; 95%CI:11.8-15.6) patients. The total of 523 (40.3%; 95%CI:37.6-43.0) patients had more than one systemic finding.

Preoperative ultrasonography examination showed that 668 (51.4%; 95%CI:48.7-54.2) of all eyes had no ultrasonography changes or visually insignificant vitreous opacities detectable with higher gain examination (Table 1.). Out of 801 patients with good posterior eye segment visualization, 335 (41.8%; 95%CI:38.4-45.3) patients had one or more ultrasonography findings. In patients with poor visualization, this percentage was significantly higher, 295 out of 497 (60.6%; 95%CI:56.1-64.9) patients (p<0.001). Age, gender, side, and cataract morphology were not found to be statistically significant factors for the presence of visually significant posterior segment findings. Complete PVD was present in 336 (25.9%; 95%CI:23.5-28.4) patients, 180 (22.5%; 95%CI:19.6-25.5) patients with good and 156 (31.4%; 95%CI:27.3-35.7) patients with poor visualization. Incomplete PVD was detected in total of 233 (17.9%; 95%CI:15.9-20.1) patients, 123 (15.4%; 95%CI:12.9-18.0) with good and 110 (22.1%; 95%CI:18.6-26.0) patients with poor visualization.

Table 1. Preoperative findings of ocular ultrasonography

Ultrasonography findings	Total Number (%)	Good visualization Number (%)	Poor visualization Number (%)	P value
Without any changes	395 (30.4)	276 (34.5)	119 (23.9)	0.003
Insignificant vitreous opacities	273 (21.5)	190 (23.7)	83 (16.7)	0.014
Vitreous opacities (only)*	509 (39.2)	282 (35.2)	227 (45.7)	0.014
Proliferative vitreo-retinopathy (only)*	19 (1.5)	9 (1.1)	10 (2.0)	0.202
Posterior staphyloma	33 (2.5)	20 (2.5)	13 (2.6)	0.016

Ultrasonography findings	Total Number (%)	Good visualization Number (%)	Poor visualization Number (%)	P value
Tractional retinal detachment	11 (0.8)	2 (0.2)	9 (1.8)	0.003
Retinal thickening in the macula	19 (1.5)	10 (1.2)	9 (1.8)	0.419
Traces of previous vitreous haemorrhage	5 (3.8)	0	5 (1.0)	0.005
Synchisis scintilans	15 (1.2)	9 (1.1)	6 (1.2)	0.892
Asteroid hyalosis	7 (0.5)	0	7 (0.57)	0.001
Retinoshisis	4 (0.3)	0	4 (0.8)	0.011
Enlargement of the optic nerve excavation	6 (0.5)	3 (0.3)	3 (0.6)	0.556
Rhegmatogenous retinal detachment	2 (0.1)	0	2 (0.4)	0.073

*Vitreous opacities and proliferative vitreoretinoapthy without other significant findings such as tractional retinal detachment, posterior staphyloma or rhegmatogenous retinal detachment

After clinical and ultrasonography examination, 11 (0.8%; 95%CI:0.4-1.5) patients were found to have significant posterior segment changes and were sent to the retina department, and 2 (0.1%; 95%CI:0.0-0.5) of them had good visualization. Therefore, 1287 patients were operated and all of them had IOL implantation with no case of endophthalmitis or nucleus drop. Phacoemulsification was performed in 1191 (91.5%; 95%CI:87.4-97.9) and ECCE in 96 (7.5%; 95%CI:6.0-9.1) patients. Intraoperative complications included posterior capsule tear in 23 (1.8%; 95%CI:1.1-2.7), vitreous loss in 13 (1.0%; 95%CI:0.5-1.7) and zonular dehiscence in 2 (0.1%; 95%CI:0.0-0.5) patients. Anterior chamber intraocular lens was implanted in 6 (0.4%; 95%CI:0.11.0) patients. Postoperative complications included striate keratitis in 109 (8.5%; 95CI:6.9-10.2), wound leak in 9 (0.7%; 95%CI:0.3-1.3) and lens matter in anterior chamber in 7 (0.5%; 95%CI:0.2-1.1) patients. Total of 380 (29.5%; 95%CI:27.0-32.1) surgeries were performed by residents. In their case, the intraoperative complications were noted in 12 cases (3.2%; 95%CI:1.6-5.4), while the rate of complications for experienced surgeons was 26 cases (2.9%; 95%CI:1.9-4.2) (p=0.98). There was no difference in complication rates by sex, age, preoperative vision, type of cataract, ultrasound findings, and systemic complications. However, there was a 9-fold higher complication rate in eyes with ocular comorbidities, 15.5% compared to 1.7% in eyes without ocular comorbidities (p=0.000). None of the ocular comorbidities in particular presented a significantly higher association with cataract surgery complications. In addition, patients with worse preoperative VA had a higher rate of intraoperative complications (p=0.026).

All operated patients (100%) were present at one week follow-up. Out of them, 1090 (84.7%; 95%CI:82.6-86.6) patients had BCVA 6/12 or better, 145 (11.3%; 95%CI:9.6-13.1) had borderline BCVA (6/24-6/60) and 52 (4.0%; 95%CI:3.0-5.3) had poor BCVA (<6/60). The total of 296 (23.0%; 95%CI:20.7-25.4) patients did not show at 4 weeks follow-up, leaving 991 (77.0%; 95%CI:74.6-79.3) patients available for further follow-up. Out of these patients, 925 (93.3%; 95%CI:91.6-94.8) of them had good, 40 (4.0%; 95%CI:2.9-5.5) borderline and 26 (2.6%; 95%CI:1.7-3.8) had poor BCVA. Selection was the main cause for BCVA less than 6/18, which was noted in 83.3% of patients (55 out of 66, 95%CI:72.1-91.4), where 36 (65.4%; 95%CI:51.4-77.8) patients had borderline and 19 (34.6%; 95%CI:22.2-48.6) poor postoperative BCVA (Table 2.). Surgical complications included one (0.8%; 95%CI:0.1-4.3) patient that needed IOL reposition and 10 (0.8%; 95%CI:0.4-1.4) patients that had persistent striate keratitis which required hospitalization. Four (0.3%; 95%CI:0.1-0.8) patients later progressed to bullous keratopathy and are counted in surgical complications and not in surgical sequelae. Out of 296 patients that did not appear at second follow-up, first examination revealed 246 (83.1%; 95%CI:78.3-87.2) patients with good, 39 (13.2%; 95%CI:9.5-17.6) borderline and 11 (3.7%; 95%CI:1.9-6.5) patients with poor postoperative BCVA. Twenty-three (7.8%, 95%CI:5.0-11.4) patients had signs of striate keratitis while 3 (0.1%; 95%CI:0.0-0.3) patients had intraoperative complications.

Table 2. Causes of visual impairment after cataract surgery

Cause of visual impairment	Borderline BCVA 6/60-6/18 (n = 40)	Poor BCVA <6/60 (n = 26)	Total BCVA <6/18 (n = 66)
Selection			
Macular diseases	21 (52.5%)	8 (30.8%)	29 (43.9%)
Diabetes complications	11 (27.5%)	8 (30.8%)	19 (28.8%)
Glaucoma	4 (10.0%)	3 (11.5%)	7 (10.6%)
Corneal disease	0 (0%)	0 (0%)	0 (0%)
Surgical complications	4 (10.0%)	7 (26.9%)	11 (16.7%)
Spectacles	0 (0%)	0 (0%)	0 (0%)
Surgical sequelae	0 (0%)	0 (0%)	0 (0%)

BCVA – best corrected visual acuity

Multivariate analysis of factors influencing cataract surgery complications and visual outcomes after 4 weeks are presented in Table 3. Additionally, at 4 weeks follow-up there were no statistically significant differences in surgery complications or visual outcome between right and left eyes, preoperative visual acuity, morphologic type of cataract, presence of systemic comorbidities, surgeons' level of experience and type of surgery. In patients with poor or borderline BCVA, preoperative ultrasonography found significant posterior segment pathology in 94.1% of patients (32 out of 34) with poor posterior segment visualization, while in patients with good visualization this percentage was much lower than 75.0% (24 out of 32) (p=0.03). There were no cases with symptoms of cystoid macular oedema found during the follow-up.

Table 5. Multivariate analyses of factors influencing surgery complications and outcomes

Variable	Intraoperative and postoperative complications			BCVA 4 weeks after surgery		
	No (%)	Yes (%)	P value	>6/18 Number (%)	<6/18 Number (%)	P value
Gender						
Male	443 (92.9)	34 (7.1)	0.005	438 (91.8)	39 (8.2)	0.065
Female	497 (96.7)	17 (3.3)		487 (94.7)	27 (5.2)	
Age						
40 – 49	18 (100)	0 (0)	0.776	17 (94.4)	1 (5.6)	0.168
50 – 59	137 (94.5)	8 (5.5)		130 (89.7)	15 (10.3)	
60 – 69	428 (95.5)	20 (4.5)		426 (95.1)	22 (4.9)	
70 – 79	311 (94.0)	20 (6.0)		308 (93.1)	23 (6.9)	
> 80	46 (93.9)	3 (6.1)		44 (89.8)	5 (10.2)	
Posterior segment visualization						
Good	561 (95.7)	25 (4.3)	0.087	554 (94.5)	32 (5.5)	0.069
Poor	379 (93.6)	26 (6.4)		371 (91.6)	34 (8.4)	
Preoperative ocular comorbidities						
Yes	79 (79.0)	21 (21.0)	0.000	82 (82.0)	18 (18.0)	0.000
No	861 (96.6)	30 (3.4)		843 (94.6)	48 (5.4)	
Systemic comorbidities						
Yes	680 (95.9)	29 (4.1)	0.15	662 (93.4)	47 (6.6)	0.525
No	260 (92.2)	22 (7.8)		263 (93.3)	19 (6.7)	

Variable	Intraoperative and postoperative complications			BCVA 4 weeks after surgery		
	No (%)	Yes (%)	P value	>6/18 Number (%)	<6/18 Number (%)	P value
Ultrasonography finding						
Yes	483 (93.8)	32 (6.2)	0.075	505 (98.1)	10 (1.9)	0.000
No	457 (96.0)	19 (4.0)		420 (88.2)	56 (11.8)	
PVD						
No	529 (94.1)	33 (5.9)	0.276	552 (98.2)	10 (1.8)	0.000
Partial PVD	238 (94.8)	13 (5.2)		203 (80.9)	48 (19.1)	
Complete PVD	173 (97.2)	5 (2.8)		170 (95.5)	8 (4.5)	
Type of IOL						
ACIOL	0 (0.0)	6	0.000	0	6 (100)	0.000
PCIOL	940 (95.4)	45 (4.6)		925 (93.9)	60 (6.1)	

ACIOL – anterior chamber intraocular lens; BCVA – best corrected visual acuity; PCIOL – posterior chamber intraocular lens; PVD – posterior vitreous detachment.

DISCUSSION

To the best of our knowledge, this is the first study from Bosnia and Herzegovina that focused on preoperative assessment and postoperative visual outcomes of cataract surgery. While the quality of cataract surgery and cataract surgical coverage overall are increasing, developing countries still have to overcome the high numbers of patients with advanced and bilateral cataracts [2,3]. This is consistent with the results of this research, where more than 52% of the patients had preoperative VA less than 6/60 in the operated eyes. Furthermore, 94% of patients in this study had operable cataract in the fellow eye. It seems that patients in Bosnia and Herzegovina come to seek cataract treatment when they feel significant visual loss [3,11]. Finally, many of the cataract surgery patients in this study had their first ever ophthalmic examination when they presented with advanced cataract [12].

Studies from different countries report good postoperative visual outcome in as low as 48.9% of patients in East Timor [13], 61.0% in China [14], and 68.7% in Burkina Faso [12]. Better results are reported in Jordan 72.7% [15], Nepal 84.7% [16], Liberia 87.9% [17], India 91.7% [4,18] and Malaysia 92.9% [19]. Our result of 93.3% is somewhat lower than 94.3% reported in European registry [20], but better than 90% recommended by WHO [10], or 85% presented in the PRECOG study [21]. Furthermore, 81.3% of our patients had presented VA 0.8 and better at 4 weeks follow-up, similar to 82.4% in European registry [20]. It has to be noted that patients with known posterior eye segment pathology were not included in this study and it has certainly improved these results to some degree.

In this study, we have found no significant differences in presenting and postoperative BCVA, unlike previous reports [4,12,16,17]. However, most of the studies from developing countries are based on ECCE and small incision cataract surgery (SICS), where postoperative refraction has a significant influence on postoperative VA [4,12,14,16,17,18,22]. Most of the patients in this study underwent phacoemulsification (92.5%), resulting in better VA and lower complication rate compared to ECCE [22].

Poor postoperative BCVA was found in 2.6% of patients and is similar to 2.5% presented in some previous studies [18,19], but is also significantly lower than 5.0% [17,21] or 16.3% presented in other research [14]. Poor or borderline outcomes were largely a result of poor selection of cases, and not from lack of spectacles [4,11,14,15]. In many cases, postoperative visual function depends more on the status of the macula and optic nerve than on the degree of the cataract that is removed [11,23]. Furthermore, patients with ocular comorbidities and patients with poor preoperative VA have higher rate of complications [17,19,24]. Overall intraoperative complication rate of 2.9% is a bit higher than previously reported in developing countries, such as China 2.4% [25], India 1.4% [4] or developed countries 1.92 [24,26]. However, different inclusion criteria between the studies are essential, since a higher rates of complications, between 6.5% and 10%, could be found in the group of patients with a high percentage of dense white or brunescent cataracts [11,27]. This is consistent with the results of this study, where a large number of patients was found with preoperative ocular and systemic comorbidities, 25.7% and 71.6%, respectively.

Special emphasis in this study was given to the prevalence and type of changes found during preoperative ocular ultrasonography examination. Previous reports show the prevalence of significant ultrasonography findings in 5.2% to 24.3% of patients with dense cataracts undergoing cataract surgery [6,7]. However, there are differences in the definition of significant changes on ultrasonography examination and patient's inclusion criteria. In this study, only 30.4% of all patients

were free of any ultrasonography findings. In particular, ultrasonography changes were more prevalent in patients with associated ocular and systemic comorbidities and in patients with poor posterior segment visualization. The presence of ultrasonography changes or PVD found during ultrasonography examination was a significant factor associated with poor postoperative visual outcome but not with the rate of intraoperative complications. Most of the patients with poor visual outcome as a result of macular changes and diabetes complications had coexisting PVD. Therefore, the presence of PVD before cataract surgery could be considered only as a possible indicator for other ocular pathologies, which could lead to poor postoperative VA.

This study has some advantages because it was a prospective study and all patients were operated and treated with the same protocol. Only the patients presented for the first time in a single tertiary health care institution were analysed in order to determine the quality of cataract surgery and the importance of preoperative ocular ultrasonography. However, there are certain limitations including clinically based design, which may lead to selection bias. Nonetheless, this study is based on a population of consecutive patients during a relatively long period, which ensures some generalizability to the underlying general population with similar clinical indications. Another limitation is the relatively short follow-up period. While all patients returned for the first follow-up one week after the surgery, a significant percentage (23%) did not show for the second follow-up. Possible explanation might be a good postoperative BCVA achieved in the first follow-up, where patients found it unnecessary to come for the second examination when everything seemed good for them [21]. However, this study has indicated that a better follow-up model is required in order to improve the postoperative results and prevent any late complications. Nevertheless, there was a significant improvement in BCVA between the two follow-ups, which might be even better if all patients presented.

CONCLUSION

This study demonstrates, for the first time, that quality cataract surgery can be achieved in Bosnia and Herzegovina. Selection, namely, macular changes and diabetes complications, as well as surgical complications were the most common causes for poor postoperative visual outcomes. Patients with preoperatively found ocular comorbidities and significant ocular findings found on ultrasonography examination were associated with poor postoperative BCVA. In this study, most of the causes for poor postoperative outcome could have been detected by preoperative clinical examination. Therefore, a proper clinical examination is invaluable for preoperative evaluation of cataract surgery candidates. Other diagnostic methods such as ultrasonography, could be helpful in patients with poor posterior eye segment visualization. The monitoring of the cataract surgery outcome should be done routinely in order to improve outcomes and detect possible risk factors for poor postoperative BCVA.

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