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ORIGINAL RESEARCH

Second Eye Syndrome: Patients' Perspectives Regarding First Eye versus Second Eye Phacoemulsification and Intraocular Lens Implantation Surgery

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Background: "Second eye syndrome" is a term used to reflect the feeling of more pain, anxiety, and longer duration of second eye cataract surgery than first eye cataract surgery. Many theories were elaborated to explain this phenomenon. This study aims to assess the subjective responses of pain, anxiety, duration of surgery, and recovery of patients who underwent bilateral uncomplicated cataract surgery.

Methods: A cross-sectional design utilizing a well-structured questionnaire was adopted in this study. All patients who underwent bilateral uncomplicated cataract surgery through phacoemulsification and intraocular lens implant, with similar best-corrected visual acuity in both eyes, were interviewed through and after each surgery. Demographics, medical history, and preoperative and operative details were collected.

Results: In this study, 347 patients were included; 199 (57.3%) were males. The operations were without intraoperative complications for both eyes. The mean value of the VAS score of the first eye was 1.95 and was 2.37 for the second eye (P = 0.02). Seventy (20.2%) patients reported that second eye surgery was more painful in comparison to 26 (7.5%) patients who reported the first eye to be more painful. The overall experience for the second eye was better in 56 (16.1%) cases and worse in 141 (40.6%). No medical or operative factor was found to affect the responses.

Conclusion: This study revealed that patients perceived more pain and less quality of visual recovery in the second eye surgery, which could be associated with psychological factors. We would suggest that all cataract surgeons pay attention to informing and reassuring patients that they are likely to feel more pain during the second eye operation.

Keywords: cataract, pain, intraocular lens implant, second eye syndrome, local anesthesia

Introduction

Phacoemulsification and intraocular lens (IOL) implantation is one of the most commonly performed eye procedures worldwide.[1] It is estimated about 26 million phacoemulsification procedures were performed around the world in 2017. The procedure is commonly performed under topical or local anesthesia; it usually takes an average of 15 minutes with experienced ophthalmologist hands and usually results in fast vision improvement and recovery.[2]

Senile cataract represents the most common type of cataract; it is mostly a bilateral condition.[3] A good percentage of patients may present with visually significant cataract in both eyes that mandates bilateral surgery. Phacoemulsification surgeries for both eyes are usually performed consecutively, with the worse-seeing eye done first.[4,5] Usually, we allow around a month between the two procedures in order to allow enough time for complete recovery. Patients' subjective

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perception of intraoperative and postoperative pain, duration of the procedure, visual recovery, and final visual outcome may differ between the two eyes despite unifying all objective procedure conditions like the operating surgeon, operation theater, phacoemulsification machine, surgery duration, and the complication rate.[6,7] "Second Eye Syndrome" refers to the common patient perception that their second cataract surgery feels different, often more unpleasant, than the first, which might affect or complicate the second eye operation.[8]

In this manuscript, we are conducting a survey of patients who received consecutive phacoemulsification and IOL implantation procedures in both eyes and have comparable intraoperative and postoperative conditions and results to assess their responses and find any significant subjective difference in their perception of pain, duration, and visual outcome between the two procedures. We will discuss possible factors that may influence their perception of any differences.

Methods

Patients and Data Collection

The study protocols were reviewed and approved by the institutional review board at Jordan University of Science and Technology. Patients who presented with bilateral age-related cataract and underwent uncomplicated phacoemulsification and posterior-chamber IOL implantation were considered eligible and included in this study. The study aims to subjectively investigate the common notice that those patients are "more satisfied" or "feeling less pain" after their first eye cataract surgery than after the second eye. Patients were invited and requested to fill out a questionnaire structured to recall their experience in the intraoperative and postoperative periods. Patients were enrolled between June 2021 and June 2024. Electronically signed informed consent was obtained from all participants. The following data were obtained for all participants: demographics and past medical history. Furthermore, details regarding the operation were allocated and included the duration between the first and second eye cataract surgery, mode of analgesia (topical or bulbar), and type and density of the cataract. Moreover, many patients received sedative medications on the day of the operation, and they were assigned. Additionally, information regarding the teaching purposes of parts of cataract surgery for the residents, and the best-corrected visual acuity (BCVA) at one month postoperatively was specified.

All patients within that period who underwent uncomplicated local bilateral phacoemulsification with posterior-chamber IOL implantation with similar objective postoperative course (between the first and second eye) were included in the study. Exclusion criteria included baseline eye pain, muscle spasm around the eye, patients with anxiety or similar psychological disorders, language barriers, deafness, inability to understand the questionnaires, patients receiving general anesthesia, and patients with involuntary movements. Furthermore, patients with a history of allergy to topical anesthetics, posterior synechiae or floppy iris syndrome, and cases taking longer than 45 minutes were also excluded. Moreover, patients with previous ocular surgery, intraoperative complications, patients who experienced postoperative complications that may influence their experience (such as inflammatory response, prolonged corneal edema, and high intraocular pressure), and those who missed the postoperative clinics were also excluded. Finally, patients with a difference of 2 lines or more of BCVA between the two eyes were excluded.

Subjective Scales and Questionnaires

Surgeons were blinded to the results. The questionnaire domains were orally administered by well-trained investigators. The questionnaire utilized was provided in Supplementary Material. Intraoperative and postoperative pain, anxiety, and satisfaction were evaluated using the visual analog scale (VAS) for pain (ranging from 0 (no pain) to 10 (unbearable pain)), and the validated simplified State-Trait Anxiety Inventory. The VAS score was utilized to assess the intraoperative and postoperative pain. During the second-eye surgery, patients were also asked the same questions and were requested to compare the responses during their first-eye and second-eye surgery.

The participants were also asked 5 closed-ended questions for both first and second eye surgery separately and in comparison. Question 1, "Intraoperative subjective assessment of pain", and the responses were "none, mild, moderate, and severe". Question 2, "Postoperative subjective assessment of pain", and the responses were similar to question 1. Questions 1 and 2 were structured to investigate the overall subjective response to pain. Question 3 was "The

estimated time of the surgery" and the responses were "short, moderate, and lengthy". This question reflected the subjective response of the patients toward the time and the actual surgical time was comparable. Question 4 was about "the visual recovery after the operation" which also had the same responses as question 3. Question 5 was designed to investigate the subjective pleasure of the final visual acuity "final visual acuity subjectively" and the responses were "good, moderate, and bad". After asking these 5 questions, patients were asked to compare the overall experience of the second eye surgery in comparison to the first eye surgery, and the responses were "I had a better experience during the second procedure", "I had the same experience during the second procedure", and "I had a worse experience during the second procedure". Further questions were elaborated regarding the sounds, talks and instruments that were remembered by the patients.

Surgical Settings

Two consultant ophthalmologists performed surgical operations and supervised the teaching steps in accordance with similar procedural institutional guidelines. The same operating theater was utilized for all procedures using the same surgical instruments and the surgical time was comparable. Furthermore, both eyes for each patient were operated on by the same consultant surgeon. Topical cyclopentolate and phenylephrine were administered 30 min before surgery to achieve full dilation of the pupil. Analgesics included topical tetracaine 0.5% and intracameral preservative-free lidocaine 1.0%. The peribulbar block comprised the injection of 3–5 mL of 2.0% lidocaine through a retrobulbar cannula (40 mm length, 24-gauge). Some patients received preoperative sedatives of 0.25 mg alprazolam 4 hours prior to the operation. The patient was prepped and draped in the usual sterile ophthalmic fashion. A lid speculum was placed, and the operating microscope was brought into position with the surgeon seated at the superior or temporal position. After that, the conjunctival sac was filled with povidone iodine. Following the side port incision, a 2.8 mm clear corneal incision was constructed, and a 5.5 mm continuous curvilinear capsulorhexis was created. Hydrodissection, phacoemulsification, and aspiration of cortex were then performed. A foldable intraocular lens (from several manufacturers) was implanted in the capsular bag using a dedicated injector. After aspiration of residual viscoelastic, wound hydration was performed. Only uncomplicated and sutureless cases were included in this study. The minimum duration between the second and first eye operations was 1 week, and the maximum duration was 142 weeks. Regarding the role of residents, junior residents participated in pre-surgical steps including aseptic preparation and draping of the eyes. Mid-senior residents had been involved in wounds and capsulorhexis creation, and intraocular lens implantation. Senior residents participated in parts of the phacoemulsification or aspiration of the cortex. The teaching process was supervised completely by the consultant surgeons. The number of teaching parts was comparable between the first and second eye groups.

Statistical Analysis

All statistical tests were performed using SPSS v.26.0 (SPSS Inc., Chicago, IL, USA). Quantitative variables are presented as the mean ± standard deviation and qualitative data are presented as frequency (percentage). The Chi-square test was used to compare categorical variables. A P value of <0.05 was considered statistically significant in all analyses. Logistic regression analyses were employed to assess the independent factors affecting the VAS score and the overall quality. Aiming to detect a difference of 1 in the VAS scale with a power of 80%, assuming a standard deviation of 2.75, a minimal sample size of 60 patients was required.

Results

General Demographics and Clinical Characteristics

In this study, 347 patients were included. Of those 347 patients, 199 (57.3%) were males. The mean age of the patients was 66.5 years. According to the severity of cataract in the first eye, moderate cataract density was the most common type of cataract. Regarding the medical history, 233 of the patients have diabetes mellitus and 215 have hypertension. The mean duration between the second and first eye operations was 43.7 weeks (the shortest duration was 1 week, and the longest duration was 142 weeks).

Regarding the type of anesthesia, it was topical in 157 (45.2%) and peribulbar block in 190 (54.8%) of the cases in the first eye. It was topical in 162 (46.7%) and peribulbar block in 185 (53.3%) of the cases in the second eye. Preoperative sedation was used in the minority of cases. Furthermore, in 39 (11.2%) of first eyes and 66 (19.0%) of second eyes, the residents participated in operation as a teaching purpose. The general demographic and clinical characteristics were summarized in Table 1.

Table 1 General Demographic and Clinical Characteristics

Variables	**Number* (%)**
	Mean ± SEM
Sex	
Male	199 (57.3)
Female	148 (42.7)
Age (years)	66.5 ± 1.5
Severity of cataract of the 1st eye	
Early cataract	111 (32.0)
Moderate cataract	174 (50.1)
Dense cataract	52 (15.0)
Mature cataract	10 (2.9)
Severity of cataract of the 2nd eye	
Early cataract	88 (25.4)
Moderate cataract	190 (54.8)
Dense cataract	64 (18.4)
Mature cataract	5 (1.4)
Duration between second and first eye operations (weeks)	43.7 ± 3.2
Past medical history	
Diabetes mellitus	233 (67.1)
Hypertension	215 (62.5)
Mode of analgesia of the 1st eye	
Topical	157 (45.2)
Peribulbar block	190 (54.8)
Mode of analgesia of the 2nd eye	
Topical	162 (46.7)
Peribulbar block	185 (53.3)
Performed by teaching residents (1st eye)	39 (11.2)
Performed by teaching residents (2nd eye)	66 (19.0)
Utilization of preoperative sedation (1st eye)	21 (6.1)
Utilization of preoperative sedation (2nd eye)	45 (13.0)

Note: *Number = 347.

Responses of the Participants to the Questionnaire

The mean value of the VAS score of the first eye was 1.95 ± 0.09, in comparison to 2.37 ± 0.1 of the second eye (P = 0.02). According to the subjective assessment of intraoperative pain during the first eye, it was mild in 84, moderate in 32, severe in 5 and there was no pain in 226 cases. While in the second eye, the subjective assessment of intraoperative pain revealed that the pain was mild in 103, moderate in 54, severe in 5 and there was no pain in 185 patients (P = 0.009).

Regarding the subjective assessment of the postoperative pain during the first eye, it was mild in 96, moderate in 8, severe in 2 of cases and there was no pain in 241 patients. Moreover, the subjective assessment for the postoperative pain during the second eye showed that it was mild in 104, moderate in 24, severe in 4 cases and there was no pain in 215 cases (P = 0.015).

Comparison of the second eye operation to the first eye operation in terms of the estimated duration, 16 patients responded that the second eye surgery duration was shorter, 262 said it was the same, and 69 said it was longer (P = 0.001).

Regarding the final visual satisfaction of the first eye, patients responded as adequate satisfaction in 274 cases, moderate satisfaction in 60 cases and poor satisfaction in 13 cases. While satisfaction of the second eye was adequate in 243 cases, moderate in 82 cases and poor in 22 cases (P = 0.023). The overall experience of the second eye in comparison to the first eye operation was better in 56 cases, the same in 150, and worse in 141. The responses of participants to the questionnaire were summarized in Table 2. Table 3 summarized the statistical differences between the first and second eyes.

Table 2 Response of the Participants to the Questionnaire

Variables	**Number***	**Percentage (%)**
	Mean ± SEM	
VAS score for the 1st eye	1.95 ± 0.09	
VAS score for the 2nd eye	2.37 ± 0.1	
Subjective assessment of the intraoperative pain during the 1st eye		
None	226 (65.1)	
Mild	84 (24.2)	
Moderate	32 (9.2)	
Severe	5 (1.4)	
Subjective assessment of the intraoperative pain during the 2nd eye		
None	185 (53.3)	
Mild	103 (29.7)	
Moderate	54 (15.6)	
Severe	5 (1.4)	
Comparison of 2nd eye to 1st eye operation in term of the subjective intraoperative pain		
Better	26 (7.5)	
Same	251 (72.3)	
Worse	70 (20.2)	

(*Continued*)

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Table 2 (Continued).

Variables	Number*	Percentage (%)
	Mean ± SEM	
Subjective assessment of the postoperative pain during the 1st eye		
None	241 (69.5)	
Mild	96 (27.7)	
Moderate	8 (2.3)	
Severe	2 (0.6)	
Subjective assessment of the postoperative pain during the 2nd eye		
None	215 (62.0)	
Mild	104 (30.0)	
Moderate	24 (6.9)	
Severe	4 (1.2)	
Comparison of 2nd eye to 1st eye operation in term of the subjective postoperative pain		
Better	11 (3.2)	
Same	292 (84.1)	
Worse	44 (12.7)	
Estimated duration of 1st eye operation		
Short	287 (82.7)	
Moderate	50 (14.4)	
Long	10 (2.9)	
Estimated duration of 2nd eye operation		
Short	232 (66.9)	
Moderate	89 (25.6)	
Long	26 (7.5)	
Comparison of 2nd eye to 1st eye operation in term of the estimated duration		
Better	16 (4.6)	
Same	262 (75.5)	
Worse	69 (19.9)	
Duration of visual recovery of 1st eye		
Short	278 (80.1)	
Moderate	57 (16.4)	
Long	12 (3.5)	

(*Continued*)

Table 2 (Continued).

Variables	Number*	Percentage (%)
	Mean ± SEM	
Duration of visual recovery of 2nd eye		
Short	245 (70.6)	
Moderate	73 (21.0)	
Long	29 (8.4)	
Comparison of 2nd eye to 1st eye operation in term of the duration of visual recovery		
Better	14 (4.0)	
Same	281 (81.0)	
Worse	52 (15.0)	
Final visual outcome of 1st eye		
Good satisfaction	274 (79.0)	
Moderate satisfaction	60 (17.3)	
Poor satisfaction	13 (3.7)	
Final visual outcome of 2nd eye		
Good satisfaction	243 (70.0)	
Moderate satisfaction	82 (23.6)	
Poor satisfaction	22 (6.4)	
Comparison of 2nd eye to 1st eye operation in term of the final visual outcome		
Better	35 (10.1)	
Same	244 (70.3)	
Worse	68 (19.6)	
The overall experience of the 2nd eye in comparison to the 1st eye operation		
Better	56 (16.1)	
Same	150 (43.2)	
Worse	141 (40.6)	

Note: *Number = 347.
Abbreviation: VAS, Visual Analogue Scale.

Factors Affecting the Overall Experience of the Second Eye in Comparison to the First Eye Operation

The study revealed that there was no influence for age, gender or presence of diabetes mellitus on the overall experience of the second eye in comparison to the first eye operation. Moreover, the severity of cataract, the duration between the second and first eye operations, the mode of analgesia and the utilization of preoperative sedation did not affect the overall experience. In addition to that, performing the operation by residents had no effect. As no preoperative or intraoperative factor had an influence on the overall experience of the patients, the psychological factor could have a contribution. A multiple logistic regression analysis test was performed and revealed that no factor has been associated

Table 3 Differences Between First Eye and Second Eye Responses

Variables	Number (%) or Mean ± SEM		
	First Eye Responses (n = 347)	Second Eye Responses (n = 347)	*P*-value
Subjective assessment of the intraoperative pain			
None	226 (65.1)	185 (53.3)	
Mild	84 (24.2)	103 (29.7)	0.009
Moderate	32 (9.2)	54 (15.6)	
Severe	5 (1.4)	5 (1.4)	
Subjective assessment of the postoperative pain			
None	241 (69.5)	215 (62.0)	
Mild	96 (27.7)	104 (30.0)	0.015
Moderate	8 (2.3)	24 (6.9)	
Severe	2 (0.6)	4 (1.2)	
Estimated duration			
Short	287 (82.7)	232 (66.9)	
Moderate	50 (14.4)	89 (25.6)	0.0001
Long	10 (2.9)	26 (7.5)	
Duration of visual recovery			
Short	278 (80.1)	245 (70.6)	
Moderate	57 (16.4)	73 (21.0)	0.004
Long	12 (3.5)	29 (8.4)	
Final visual outcome			
Good satisfaction	274 (79.0)	243 (70.0)	
Moderate satisfaction	60 (17.3)	82 (23.6)	0.023
Poor satisfaction	13 (3.7)	22 (6.3)	
VAS score	1.95 ± 0.09	2.37 ± 0.1	0.02

Abbreviations: VAS, Visual Analogue Scale; SEM, standard error of mean.

with the overall experience. The factors affecting the overall experience of the second eye, in comparison to the first eye operation, were summarized in Table 4.

Factors Affecting the VAS Score of the First and the Second Eye

There was no influence of age, gender, presence of diabetes mellitus, severity of cataract and utilization of preoperative sedation on the VAS score of both eyes. The study revealed that the mode of analgesia significantly affected the VAS score of the first eye, in which the VAS score was 2.23 ± 0.2 with topical and 1.72 ± 0.1 with peribulbar analgesia of the first eye ($P < 0.05$). On multiple logistic regression test, only the mode of anesthesia was found to influence the VAS score. Factors affecting the VAS score of the first and the second eyes were summarized in Table 5.

Table 4 Factors Affecting the Overall Experience of the 2nd Eye in Comparison to the 1st Eye Operation

Variables	Number (Percentage) or Mean ± SEM			
	Worse	Same	Better	p-value
Sex				NS
Male	75 (37.7)	91 (45.7)	33 (16.6)	
Female	66 (44.6)	59 (39.9)	33 (15.5)	
Age (years)	64.7 ± 0.6	66.0 ± 0.6	73.2 ± 0.9	NS

(*Continued*)

Table 4 (Continued).

Variables	Number (Percentage) or Mean ± SEM			
	Worse	**Same**	**Better**	**p-value**
Severity of cataract of the 1st eye				NS
Early cataract	38 (34.2)	51 (45.9)	22 (19.8)	
Moderate cataract	72 (41.4)	77 (44.3)	25 (14.4)	
Dense cataract	25 (48.1)	20 (38.5)	7 (13.5)	
Mature cataract	6 (60.0)	2 (20.0)	2 (20.0)	
Severity of cataract of the 2nd eye				
Early cataract	36 (40.9)	42 (47.7)	10 (11.4)	NS
Moderate cataract	74 (38.9)	86 (45.3)	30 (15.8)	
Dense cataract	29 (45.3)	20 (31.3)	15 (23.4)	
Mature cataract	2 (40.0)	2 (40.0)	1 (20.0)	
Duration between second and first eye operations (weeks)	49.0 ± 5.6	37.5 ± 4.2	46.9 ± 6.1	NS
Mode of analgesia of the 1st eye				
Topical	65 (41.4)	68 (43.3)	24 (15.3)	NS
Peribulbar block	76 (40.0)	82 (43.2)	32 (16.8)	
Mode of analgesia of the 2nd eye				
Topical	69 (42.6)	69 (42.6)	24 (14.8)	NS
Peribulbar block	72 (38.9)	81 (43.8)	32 (17.3)	
Performed by teaching residents (1st eye)	14 (35.9)	22 (56.4)	3 (7.7)	NS
Performed by teaching residents (2nd eye)	31 (47.0)	26 (39.4)	9 (13.6)	NS
Utilization of preoperative sedation (1st eye)	9 (42.9)	9 (42.9)	3 (14.2)	NS
Utilization of preoperative sedation (2nd eye)	20 (44.4)	15 (33.3)	10 (22.2)	NS

Abbreviations: SEM, standard error of mean; NS, not significant.

Table 5 Factors Affecting the VAS Score of the 1st and the 2nd Eyes

Variables	Mean ± SEM* or B Regression Coefficient ± SEM**			
	VAS Score of the 1st Eye	***P*-value**	**VAS Score of the 2nd Eye**	***P*-value**
Sex				
Male	1.97 ± 0.1	NS	2.33 ± 0.1	NS
Female	1.93 ± 0.1		2.43 ± 0.2	
Age (years)**	0.006 ± 0.003	NS	0.004 ± 0.004	NS
Severity of cataract of the 1st eye				
Early cataract	1.88 ± 0.1			
Moderate cataract	1.98 ± 0.1	NS		
Dense cataract	2.02 ± 0.2			
Mature cataract	1.80 ± 0.5			

(*Continued*)

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Table 5 (Continued).

Variables	Mean ± SEM* or B Regression Coefficient ± SEM**			
	VAS Score of the 1st Eye	*P*-value	VAS Score of the 2nd Eye	*P*-value
Severity of cataract of the 2nd eye				
Early cataract			2.52 ± 0.1	
Moderate cataract			2.36 ± 0.2	NS
Dense cataract			2.25 ± 0.1	
Mature cataract			1.80 ± 0.3	
Past medical history				
Diabetes mellitus	1.93 ± 0.1		2.31 ± 0.1	
Mode of analgesia of the 1st eye				
Topical	2.23 ± 0.2	0.006		
Peribulbar block	1.72 ± 0.1			
Mode of analgesia of the 2nd eye				
Topical			2.49 ± 0.1	NS
Peribulbar block			2.27 ± 0.1	
Performed by teaching residents (1st eye)	1.41 ± 0.1	0.036		
Performed by teaching residents (2nd eye)			1.79 ± 0.2	0.005
Utilization of preoperative sedation (1st eye)	1.43 ± 0.3	NS		
Utilization of preoperative sedation (2nd eye)			2.60 ± 0.2	NS

Notes: *The test used is ANOVA test. **The test used is linear regression analysis.
Abbreviations: VAS, Visual Analogue Scale; SEM, standard error of mean; NS, not significant.

Discussion

To the best of our knowledge, this is the first study conducted in Jordan to assess the phenomenon of "second eye syndrome". Furthermore, the study included and investigated multiple factors that might affect the patients' experience in a comprehensive manner. The study assessed the subjective responses of patients who underwent bilateral uncomplicated cataract surgery with the aim of investigating and justifying any adjuvant factors that may affect the pain or anxiety responses. This study concluded that the term "second eye syndrome" could be due to a psychological background. The "second eye syndrome" means that patients felt that the second eye surgery was more painful, lengthy, and had longer recovery than the first eye. In our results, these phenomena were statistically significant, and no clinical or ophthalmic factors affected these results.

Cataract is the major cause of reversible vision loss worldwide and surgical treatment is the only cure.[1,8] Phacoemulsification surgery is the most common technique used for cataract removal. It is commonly performed in the more affected eye first.[2,9] Topical anesthesia is the preferred method for cataract surgery, which helps to ease the surgery, reduce pain and lower the need for general anesthesia as well.[8,10,11] The procedure is generally considered safe with a low risk of medical complications. However, if medical complications do occur, the most common ones are transient bradycardia and hypertension.[12–14]

Pain during cataract surgery is generally minimal due to the use of local anesthesia. However, when patients do experience discomfort, it can arise from several sources.[15,16] First, anterior chamber distention can occur during various surgical steps, such as hydrodissection, infusion during phacoemulsification, cortex aspiration, and viscoelastic removal. The distention can stimulate pain receptors, leading to discomfort.[17] Second, instrument indentation can result from instruments indenting ocular structures during maneuvers like lens chopping, cortex aspiration, or insertion of the intraocular lens (IOL) cartridge into the anterior chamber.[17] Third, higher preoperative baseline IOP may contribute to the elevation of IOP during the surgery and thus, increase intraoperative pain.[18] Finally, multiple anatomical factors could contribute to the intraoperative pain such larger anterior chamber depth or greater axial length.[18–20] Furthermore, patients with higher levels of preoperative anxiety have been identified as significant predictors of increased pain perception during cataract surgery.[21–25]

Several studies examined the pain experience and satisfaction of patients in bilateral cataract operations. A study conducted by Aslan et al examined pain perception and patient cooperation during their first and second cataract surgeries.[10] The study included 60 patients with bilateral cataracts who had cataract surgery using the phacoemulsification technique under topical and intracameral anesthesia, but no sedatives or painkillers were given. Pain levels (VAS scores) and cooperation were significantly worse in the second-eye surgery compared to the first ($p < 0.001$), the study showed a strong link between pain and poor cooperation.[10] However, it was unaffected by sex or laterality. The authors suggested that patients might feel more pain during the second surgery because they are more aware of what to expect, their anxiety is lower (which might make them more sensitive to discomfort), or their nervous system has become more responsive after the first surgery.[10] Based on their findings, the authors recommend that doctors consider using mild sedatives or stronger pain management for second-eye cataract surgeries to improve patient comfort and cooperation.[10]

Another study by Adatia et al examined patients' pain and perceptions during first and second cataract surgeries.[9] The authors focused on factors like anxiety, memory, and expectations. They found that patients frequently report more pain and worse experiences during second eye cataract surgery than during their first surgery.[9] It was suggested that to overcome issues with recall potentially influencing patient reports, authors have devised several methods of questionnaire administration.[9] Luo et al assessed patients perceptions of pain, fear, and sensory experiences during first and second eye cataract operations using assisted topical anesthesia.[8] It involved 127 patients who underwent cataract surgery using assisted topical anesthesia, with results showing no significant differences between the first and second eye surgeries.[8] A small but significant correlation was found between sensory perceptions and combined pain, fear, and anxiety scores. The study concluded that preoperative counseling for the second eye should be as thorough as for the first eye, as patients did not report significantly lower levels of discomfort or fear during their second surgery.[8]

An intraindividual study by Bardocci investigated whether second-eye cataract surgery under topical anesthesia is more painful than the first eye procedure and if pain from the first surgery can predict the second.[26] A total of 73 patients undergoing bilateral cataract surgery were included. Pain was measured using VAS score, and cooperation was graded by the surgeon. The study found no significant difference in pain between the first and second eye surgeries (VAS scores of 2.35 and 2.89, respectively).[26] There was a significant correlation between pain scores of the two procedures, suggesting that pain experienced during the first surgery can predict the second. Cooperation did not differ between procedures. The study concluded that pain and cooperation are similar in both procedures, and adjustments to anesthesia may be needed based on the first procedure's pain score.[26] A study by Huo et al investigated the influence of duration between both eyes' operation on mental health and they concluded that scheduling both surgeries within a short time interval may be beneficial for maximizing the effects of cataract surgery in reducing the number of mental health consultations.[27] However, no correlation between this duration and between the intraoperative and postoperative patients' experience was conducted. In our study, the duration was shown to have no effect on patients' experience.

Theories that may explain the phenomena of "second eye syndrome" include the physiological perception of the second eye as "worse" in cataract surgery because the surgeons typically operate on the more severely affected eye first, leading to an obvious improvement in vision noticed to the patient. In contrast, the second eye, which is often less impaired preoperatively, makes the outcome feel subjectively less significant.[28] Also, patients undergoing their first eye surgery often expect a long procedure but are gladly surprised that it is shorter than expected. By the time of the second surgery, this expectation has been adjusted, reducing the psychological contrast effect, making the experience feel less remarkable or even more uncomfortable. Regardless of similar operative and anesthesia conditions, patients who underwent second-eye cataract surgery often reported a higher degree of pain and intraoperative awareness compared to their experience during the first surgery.[12,26,28–33]

The choice between topical and retrobulbar anesthesia depends on important factors including pain control, patient discomfort, and visual recovery. Easy administration, less patient discomfort, faster visual recovery, less post-operative pain, less time consuming are all benefits of topical anesthesia.[34–36] Although retrobulbar anesthesia ensures akinesia,[37,38] literature shows many serious complications of retrobulbar anesthesia, among them, globe perforation, retrobulbar hematoma, and central nervous system involvement, have been reported.[39]

Our study is not without limitations. The study was based on subjective parameters, which could be affected by several biased factors. Moreover, the relatively small size of the study could affect the results. Furthermore, performing the operations by two surgeons might affect the results. Additionally, long-term follow-up of the patients was not provided.

Conclusions

Our findings have revealed that patients perceived more pain and less quality of visual recovery in the second eye surgery, which may be associated with various anxiety responses. The results of this study were subjective (pain and quality). According to our results, we would suggest that all cataract surgeons pay not just the same attention to informing and reassuring patients undergoing second eye procedures as they do at first eye surgeries; however, in order to avoid any disappointment, warn patients that they are likely to feel more pain and discomfort during the second eye operation. Moreover, patients should be counseled regarding the subjective assessment of the duration of surgery, and postoperative visual recovery. The counselling could be done at the outpatient clinic or in the operation theater just before the second eye operation. Avoiding talks in theater that might describe the details of the operation or noise is crucial. Furthermore, the surgeon himself should be calm, especially during difficult situations. Further studies to investigate the reasons for these phenomena should be conducted.

Data Sharing Statement

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Ethics Approval and Consent to Participate

Ethical approval was obtained from the Institutional Board Review (IRB) of Jordan University of Science and Technology (number: 6/174/2024, date: 22/10/2024). All patients provided electronic informed consent before enrolment into the study. The study was conducted in accordance with the Declaration of Helsinki, good clinical practices and relevant regulatory guidelines.

Consent for Publication

Electronic informed consent was obtained from all patients. The electronic consent was signed and preserved on Google-sheet by the participants during the interview. The IRB approved this method.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors declare that they have no competing interests.

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