

Life quality assessment before and after cataract surgery with intraocular lens implantation

Análise da qualidade de vida antes e após cirurgia de catarata com implante de lente intraocular

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ABSTRACT

Objective: To analyze patients' quality of life before and after cataract removal surgery associated with intraocular lens (IOL) implantation. **Methods:** This is an observational, prospective, case series study. Data were collected at a private ophthalmology service in Aracaju – SE, from August 2018 to July 2019. The quality of life assessment of patients before and after 4 months of cataract surgery, using the phacoemulsification technique associated with IOL implantation, was performed by applying the validated Brazilian version of the 25-item Visual Function Questionnaire from the National Eye Institute (NEI-VFQ-25) and performing the visual acuity test with the Snellen chart. **Results:** The final group consisted of 41 patients, with a mean age of 72 years (SD: 9.01), of which 14 were male and 27 female. In addition, out of 41 patients, 37 underwent facetectomy in both eyes, 03 only in the right eye and 01 only in the left eye. Given the collection and thorough analysis of the data, the improvement in the quality of life of patients submitted to cataract surgery with intraocular lens implantation was noticed. There was a statistically significant increase ($p < 0.001$) in binocular visual acuity, monocular visual acuity and scores in 11 of the 12 subdomains of the NEI-VFQ-25. No statistical significance was observed in the subdomain “Eye Pain” ($p = 0.934$). **Conclusion:** There was a significant improvement in the quality of life of patients who underwent cataract surgery with intraocular lens implantation.

Keywords: Quality of life; Lenses, intraocular; Cataract; Visual acuity; Patient health questionnaire

RESUMO

Objetivo: Analisar a qualidade de vida dos pacientes antes e após cirurgia de remoção da catarata associada ao implante de lente intraocular (LIO). **Metodos:** Este é um estudo observacional, prospectivo, de série de casos. Os dados foram coletados em um serviço privado de oftalmologia em Aracaju - SE, de agosto de 2018 a julho de 2019. A avaliação da qualidade de vida de pacientes antes e após 4 meses da cirurgia de catarata, pela técnica de facoemulsificação associada ao implante de LIO, foi realizada aplicando a versão brasileira validada do Questionário de Função Visual de 25 itens do National Eye Institute (NEI-VFQ-25) e realização do teste de acuidade visual com a tabela de Snellen. **Resultados:** O grupo final foi constituído por 41 pacientes, com média de idade de 72 anos (DP: 9,01), sendo 14 do sexo masculino e 27 do feminino. Além disso, dos 41 pacientes, 37 foram submetidos à facectomia em ambos os olhos, 03 apenas no olho direito e 01 apenas no olho esquerdo. Diante da coleta e da análise dos dados, notou-se melhora na qualidade de vida dos pacientes submetidos ao procedimento cirúrgico proposto. Houve um aumento estatisticamente significativo ($p < 0,001$) na acuidade visual binocular, na acuidade visual monocular e nas pontuações de 11 dos 12 subdomínios do NEI-VFQ-25. Não foi observada significância estatística no subdomínio "Dor ocular" ($p = 0,934$). **Conclusão:** Houve melhora significativa na qualidade de vida dos pacientes submetidos à cirurgia de catarata com implante de LIO.

Descritores: Qualidade de vida; Lentes intraoculares; Catarata; Acuidade visual; Questionário de saúde do paciente

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INTRODUCTION

Cataracts is the main eye disease among those capable of causing blindness; it lies on the eye lens' opacification process, which leads to partial or total blindness. According to estimates, approximately 18 million individuals worldwide are blind in both eyes due to this condition. Blindness caused by cataracts depends on individuals' exposure to sunlight, socioeconomic status and region of residence; rates range from 5% in Western Europe, North America and Western Pacific countries to 50%, or more, in the least developed countries. Old age is the main non-modifiable risk factor for this disease. In addition, eye trauma, previous eye diseases, comorbidities such as diabetes mellitus, exposure to ultraviolet radiation and smoking are other important risk factors in the genesis of cataracts.⁽¹⁻³⁾

Cataracts is an insidious and progressive disease that often manifests itself through decreased visual acuity, increased sensitivity to light, glare, changes in color vision and refractive measurements. Age-related cataracts often compromise both eyes, although it may show asymmetric evolution. These patients often present low visual acuity at ophthalmic examination based on the Snellen chart; the opacification of eye lens is often evidenced through the examination of this segment prior to biomicroscopy, under drug mydriasis.⁽³⁻⁵⁾

It is necessary associating clinical data reported by patients and objective signs observed in the examination of the eyes in order to diagnose cataracts. Complementary tests may be requested to assure greater safety and effectiveness in the diagnosis or to rule out possible associated diseases. Among them, one finds applanation tonometry, retinal mapping, corneal topography and/or tomography, specular microscopy, fluorescent retinography, ultrasound and optical coherence tomography of the macular region and optic nerve.⁽⁴⁾

The surgical extraction of the opacified lens, called facemotomy, in association with the implantation of intraocular lens (IOL), is the ultimate treatment for cataracts; it is indicated whenever patients' quality of life is compromised or when they are no longer able to perform domestic tasks or labor activities. Nowadays, there are several techniques available to perform this surgical procedure; among them, one finds Extracapsular Cataract Extraction (ECCE), phacoemulsification cataract surgery (PHACO) and Femtosecond laser-assisted cataract surgery (FLACS), which associates Femtosecond laser and phacoemulsification. However, PHACO is the most used technique, since it assures greater safety at lower costs than FLACS and is lesser likely to lead to complications than ECCE; besides, it enables early visual recovery.^(6,7)

The visual acuity test based on the Snellen chart is not enough to satisfactorily measure the daily functional capacity gain associated with cataract surgery, when it is applied alone. Thus, standardized questionnaires were developed to help measuring the gain associated with the surgical procedure.⁽⁸⁾ Among them, one finds the validated Brazilian version of the 25-item National Eye Institute Visual Function Questionnaire (NEI-VFQ-25), whose items are subdivided into 12 subdomains that reflect individuals' functional capacity in the following fields: General Health and Vision, Difficulties to Perform Activities and Reactions to Visual Issues. Thus, this valid and reliable instrument is available for application in vision-related quality of life research.⁽⁹⁻¹¹⁾

Therefore, the aim of the current study was to analyze patients' quality of life before and after cataract removal in association with IOL implant.

METHODS

Study design

The current research is an observational, prospective study of a series of cases analyzed before and after surgical interventions performed from August 2018 to July 2019 – these interventions were not associated with the current research. Data were collected in a private ophthalmology clinic in Aracaju City, SE. Study sample comprised patients subjected to cataract extraction surgery based on the FACO technique in association with IOL implantation.

Surgical procedure

Surgeries were performed by two surgeons from the aforementioned service, who adopted the endocapsular phacoemulsification technique associated with topical anesthesia (0.5% proparacaine hydrochloride) and intravenous sedation (1% propofol). Surgical procedures comprised 2.2-mm temporal incision in clear cornea, capsulorhexis manually performed with forceps and nucleus fracture based on the quick-chop technique. Emulsification of the crystalline nucleus was performed inside the capsular bag; it was followed by the automated aspiration of crystalline masses and by the implantation of a foldable, hydrophobic and one-piece IOL in the capsular bag. None of the surgeries required suturing; only hydration with balanced saline solution was performed to close the incision. Signature Pro phacoemulsifier (Johnson & Johnson Vision Surgical, Inc, Santa Ana, CA, USA) was used in all surgeries. IOLMaster® 500 device (Carl Zeiss Meditec, Germany) was used to calculate IOL; target refraction - spherical equivalent - in the postoperative period was calculated for values close to zero. IOLs from two different laboratories - Johnson & Johnson Surgical Vision Ltda and Alcon Laboratories Inc - were used in the surgical procedures, namely: 22 Sensor ONE (AR40e), 6 Tecnis Multifocal (ZLB00) and 36 Tecnis ONE lenses (ZCB00) produced by the first laboratory; as well as 6 Acrysof Natural IQ (SN60WF), 4 Acrysof Restor Toric (SND1TX) and 4 Acrysof Toric lenses (SN6ATX) produced by the second laboratory.

Inclusion criteria

Inclusion criteria comprised individuals subjected to cataract surgery with IOL implantation, who were older than 18 years, either literate or illiterate, who were interested in participating in the research and who have signed the Free and Informed Consent Form (ICF).

Exclusion criteria

Exclusion criteria comprised patients who had conditions other than cataracts, that have led to decreased visual acuity.

Data collection procedure

The evaluation of patients' quality of life before, and 4 months after, cataract surgery was based on the culturally adapted and validated Brazilian version of NEI-VFQ-25 (10) (Appendix 1) and on measurements of patients' corrected visual acuity based on the Snellen chart, at the distance of 6 meters. Both instruments were applied at two different times: firstly, after surgery confirmation, more specifically in the week before the surgery; and secondly, 04

months after the procedure. In cases whose surgery was binocular, the second questionnaire was applied to patients subjected to surgery in both eyes – it was answered 04 months after the procedure was performed in the 2nd eye. It is worth emphasizing that help would be made available for eventual illiterate patients through the reading and explanation of the NEI-VFQ-25 questionnaire, as well as that the visual acuity test would be based on the Snellen chart by using pictures or the letter “E” (pointing towards different directions). Subsequently, visual acuity measurements were converted into logMAR (logarithm of the minimum angle of resolution) format. Data collection was carried out by researchers and volunteers - from the ophthalmology clinic team - who agreed to participate in the research after they were trained by the researchers in charge.

NEI-VFQ-25 interpretation

NEI-VFQ-25 is a 25-question questionnaire designed to measure patients’ visual function and the impact of several eye conditions on their quality of life. (9-11) Its 25 questions are grouped into 12 subdomains comprising one, or more, questions (each), namely: Social Aspects, Activities of Daily Living, Distance-Vision Activities, Near-Vision Activities, Ability to Drive Cars, Dependency, Eye Pain, General Health, Mental Health, Vision, Color Vision and Peripheral Vision. Each question has five possible answers - the score of each question ranges from 0 to 100 (0, 25, 50, 75 and 100 points), depending on the answer.

Statistical analysis

The adherence of continuous variables to normal distribution was tested through Shapiro-Wilk test. Normal continuous

variables were described as mean and standard deviation, whereas non-normal variables were described as median and interquartile range. Differences between means were assessed through T test for dependent samples (whenever normal) or Wilcoxon test (whenever non-normal). R Core Team 2019 was the software used for such an assessment at 5% significance level.

RESULTS

In total, 52 patients have initially participated in the study; however, 2 patients were excluded from it because, after cataract removal, they presented glaucoma-associated changes in the optic nerve that have compromised their visual acuity and field. In addition, 09 patients did not show up at the second stage of the research - i.e., 04 months after the surgical procedure - due to socioeconomic and transportation issues. Thus, the final sample comprised 41 patients: 14 men and 27 women, at mean age of 72 years (SD: 9.01). Thirty-seven (37) of the 41 patients were subjected to PHACO in both eyes; 03, only in the right eye; and 01, only in the left eye.

Tables 1 and 2 show mean scores recorded for each subdomain of the questionnaire, as well as patients’ binocular and monocular visual acuity before, and 4 months after, cataract correction surgery, respectively.

Table 1: NEI-VFQ-25 scores recorded for each subdomain before, and 4 months after, facectomy.

Improved quality of life means statistically significant increase (p <0.001) in the scores of 11 of the 12 NEI-VFQ-25 subdomains of the questionnaire, namely: Social Aspects, Activities of Daily Living, Distance-Vision Activities, Near-Vision Activities, Ability to Drive Cars, Dependency, General Health, Mental Health, Vision, Color Vision and Peripheral Vision, as

Table 1
NEI-VFQ-25 scores recorded for each subdomain before, and 4 months after, facectomy

Assessment time	Before surgery		After surgery		p value
	Mean	SD	Mean	SD	
Social Aspects	87.19	21.96	99.39	3.88	<0.001
Activities of Daily Living	75.61	31.17	99.39	3.88	<0.001
Distance-Vision Activities	64.34	32.76	98.98	5.90	<0.001
Near-Vision Activities	64.43	33.11	95.93	11.26	<0.001
Ability to Drive Cars	68.75	35.81	97.28	9.47	<0.001
Dependency	83.33	26.13	99.80	2.25	<0.001
Eye Pain	53.96	41.10	54.52	45.39	0.934
General Health	54.29	28.99	85.98	21.69	<0.001
Mental Health	69.97	34.94	75.91	41.71	<0.001
Vision	69.97	34.94	98.47	7.16	<0.001
Color Vision	78.05	28.61	98.78	5.45	<0.001
Peripheral Vision	84.76	20.82	100.00	0.00	<0.001

SD: Standard deviation. T test for dependent samples

Table 2
Patients’ visual acuity in logMAR before, and 4 months after, facectomy

Assessment time	Before surgery		After surgery		p value
	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)	
Binocular Visual Acuity:	0.30 (0.23)	0.30 (0.18-0.40)	0.06 (0.07)	0.10 (0-0.1)	<0.001
Monocular Visual Acuity:	0.39 (0.29)	0.30 (0.18-0.48)	0.08 (0.12)	0.10 (0-0.1)	<0.001

SD: Standard deviation. IQR: Interquartile range. Wilcoxon test.

shown in Table 01. Eye Pain was the only subdomain that did not show statistically significant difference ($p = 0.934$).

In addition, there was decrease in the means and medians recorded for logMAR values after PHACO surgery, i.e., patients' monocular and binocular visual acuity has improved after it. It is worth emphasizing that such an improvement was statistically significant in both visual acuity types ($p < 0.001$).

DISCUSSION

Decreased visual function caused by cataracts is associated with decreased daily functional capacity and with poor general health. ECCE, PHACO and FLACS stand out among the available treatments; however, PHACO is the most used one, since it assures greater safety at lower costs than FLACS and is lesser likely to lead to complications than ECCE; besides, it enables early visual recovery. Therefore, the current study is in compliance with the current literature regarding the option made for the surgical technique presenting proven effectiveness and the best cost-benefit ratio to perform facetectomy procedures.^(6,7)

The mean age of patients included in the current study was 72 years, which is in compliance with the literature, since cataracts mostly affect the elderly population older than 65 years. It is worth emphasizing that women were more prevalent (65.8%) than men (34.2%) in the investigated sample. These data meet the current literature, assumingly because women are known to use health services more often than men.⁽¹²⁾

Both instruments used to analyze patients' quality of life at two different research stages – i.e., NEI-VFQ-25 and Snellen chart – are reliable and valid. The questionnaire, which has been used in Brazil since 2001, has its reproducibility acknowledged and is available in Portuguese. These instruments enable Brazilian researchers to assess the impact of eye disorders, and the effects of their treatments, on quality of life associated with patients' vision.^(9-11,13)

There was overall improvement in the quality of life of patients subjected to PHACO cataract surgery in association with intraocular lens implantation. It is worth emphasizing that, despite the increased scores recorded for 11 of the 12 subdomains in the NEI-VFQ-25 questionnaire, Distance-Vision Activities, Near-Vision Activities, Ability to Drive Cars, General Health and Vision were the most significant ones. In addition, the visual acuity assessment performed at both research stages enabled observing improvements in patients' binocular and monocular visual acuity after PHACO surgery. Therefore, the current research is in compliance with the available literature on the topic.⁽¹⁴⁻¹⁷⁾

It is essential pointing out that, although the current research has achieved its goals, it has limitations. Samples comprising a larger number of patients would certainly assure more definitive conclusions.

CONCLUSION

Data collection and thorough analysis enabled perceiving improvements in the quality of life of patients subjected to cataract surgery based on the use of phacoemulsification technique in association with intraocular lens implantation.

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APPENDIX 1:

NEI-VFQ-25

PART 1 - GENERAL HEALTH AND VISION

1 - How do you classify your health?

- (1) – Excellent
- (2) – Very good
- (3) – Good
- (4) – Regular
- (5) – Poor

2 - How do you classify your vision (with glasses or contact lenses, if you wear them)?

- (1) – Excellent
- (2) – Good
- (3) – Regular
- (4) – Poor
- (5) – Very poor
- (6) – Complete blindness

3 - Have you been worried about your vision?

- (1) – No
- (2) – A little
- (3) – Sometimes
- (4) – Oftentimes
- (5) – All the time

4 - Do you feel pain or discomfort in your eyes (e.g., itching, burning, pain)? Yes or no? This pain or discomfort is:

- (1) – Not present
- (2) – Mild
- (3) – Moderate
- (4) – Severe
- (5) – Very severe

PART 2 - DIFFICULTIES TO PERFORM ACTIVITIES

Next questions refer to difficulties in performing some activities, either with glasses or contact lenses, if you wear them:

5 - Do you have a hard time reading a newspaper, book or magazine?

- (1) – No
- (2) – Mild difficulty
- (3) – Moderate difficulty
- (4) – A lot of difficulty
- (5) – Stopped reading because of vision
- (6) – Stopped reading for other reasons or is not interested in reading

6 - Do you have a hard time cooking, sewing or seeing things up close?

- (1) – No
- (2) – Mild difficulty
- (3) – Moderate difficulty
- (4) – A lot of difficulty
- (5) – Stopped doing it because of vision
- (6) – Stopped doing it for other reasons or is not interested in it

7 - Does your vision give you a hard time finding things when they are mixed with other objects (cutlery, shoes, clothes)?

- (1) – No
- (2) – Mild difficulty
- (3) – Moderate difficulty
- (4) – A lot of difficulty
- (5) – Stopped doing it because of vision
- (6) – Stopped doing it for other reasons or is not interested in it

8 - Do you have a hard time reading street signs or bus signs?

- (1) – No
- (2) – Mild difficulty
- (3) – Moderate difficulty
- (4) – A lot of difficulty
- (5) – Stopped doing it because of vision
- (6) – Stopped doing it for other reasons or is not interested in it

9 - Have you been having a hard time going down stairs?

- (1) – No
- (2) – Mild difficulty
- (3) – Moderate difficulty
- (4) – A lot of difficulty
- (5) – Stopped doing it because of vision
- (6) – Stopped doing it for other reasons or is not interested in it

10 - Have you been having a hard time seeing objects close to you when you walk by yourself?

- (1) – No
- (2) – Mild difficulty
- (3) – Moderate difficulty
- (4) – A lot of difficulty
- (5) – Stopped doing it because of vision
- (6) – Stopped doing it for other reasons or is not interested in it

11 - Do you have a hard time talking to friends or relatives because of your vision?

- (1) – No
- (2) – Mild difficulty
- (3) – Moderate difficulty
- (4) – A lot of difficulty
- (5) – Stopped doing it because of vision
- (6) – Stopped doing it for other reasons or is not interested in it

12 - Does your vision give you a hard time differentiating colors?

- (1) – No
- (2) – Mild difficulty
- (3) – Moderate difficulty
- (4) – A lot of difficulty
- (5) – Stopped changing clothes by yourself because of vision
- (6) – Stopped doing it for other reasons or is not interested in it

13 - Does your vision give you a hard time getting together with friends or relatives at home, parties or meetings?

- (1) – No
- (2) – Mild difficulty
- (3) – Moderate difficulty
- (4) – A lot of difficulty
- (5) – Stopped doing it because of vision
- (6) – Stopped doing it for other reasons or is not interested in it

14 - Does your vision give you a hard time seeing people across the street?

- (1) – No
- (2) – Mild difficulty
- (3) – Moderate difficulty
- (4) – A lot of difficulty
- (5) – Stopped doing it because of vision
- (6) – Stopped doing it for other reasons or is not interested in it

15 - Do you drive, even if from time to time?

- (1) – Yes (go to question 15c)
- (2) – No

15a- Have you never driven or given up driving?

- (1) – Never drove (go to part 3, question 17)
- (2) – Gave up

15b- If you gave up, was it because of your vision, for other reasons, or for both?

- (1) – Mainly because of vision (go to part 3, question 17)
- (2) – For other reasons (go to part 3, question 17)
- (3) – Because of vision and for other reasons (go to part 3, question 17)

15c- Do you have a hard time driving in familiar places at daylight?

- (1) – No
- (2) – Mild difficulty
- (3) – Moderate difficulty
- (4) – A lot of difficulty

16 - Do you have a hard time driving at night?

- (1) – No
- (2) – Mild difficulty
- (3) – Moderate difficulty
- (4) – A lot of difficulty
- (5) – Stopped driving because of vision
- (6) – Stopped driving for other reasons or is not interested in it

PART 3 - REACTIONS TO VISUAL ISSUES

Next questions refer to how things done by you can be affected by your vision.

17 - Have you stopped doing things you like because of your vision?

- (1) – Always
- (2) – Oftentimes
- (3) – Sometimes
- (4) – Few times
- (5) – Never

18 - Do you find yourself limited to work or to perform other activities because of your vision?

- (1) – Always
- (2) – Oftentimes
- (3) – Sometimes
- (4) – Few times
- (5) – Never

19 - Do you feel discomfort in, or around, your eyes (e.g., burning, itching, pain) that makes you stop doing things you like?

- (1) – Always
- (2) – Oftentimes
- (3) – Sometimes
- (4) – Few times
- (5) – Never

20 - Do you spend a lot of time at home because of your vision?

- (1) – Always
- (2) – Oftentimes
- (3) – Sometimes
- (4) – Few times
- (5) – Never

21 - Have you been feeling sad because of your vision?

- (1) – Always
- (2) – Oftentimes
- (3) – Sometimes
- (4) – Few times
- (5) – Never

22 - Are you afraid of doing things you were used to do (cooking, washing, working with tools, among others) because of your vision?

- (1) – Always
- (2) – Oftentimes
- (3) – Sometimes
- (4) – Few times
- (5) – Never

23 - Do you depend on what other people say because of your vision?

- (1) – Always
- (2) – Oftentimes
- (3) – Sometimes
- (4) – Few times
- (5) – Never

24 - Do you need help from others because of your vision?

- (1) – Always
- (2) – Oftentimes
- (3) – Sometimes
- (4) – Few times
- (5) – Never

25 – Does your vision make you feel afraid to do some things for fear of embarrassing yourself (e.g., going into the wrong bathroom, not talking to people you know, urinating outside the toilet, among others)?

- (1) – Always
- (2) – Oftentimes
- (3) – Sometimes
- (4) – Few times
- (5) – Never

Source: Ferraz EVAP, Lima CA, Cella W, Arieta CEL. Adaptação de questionário de avaliação da qualidade de vida para aplicação em portadores de catarata (Adaptation of quality of life evaluation questionnaire for application among cataract carriers). *Arq Bras Ophthalmol.* 2002;65(3):293-8.

ERRATA

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