

The impact of cataract surgery on vision-related quality of life for cataract patients in China: a prospective study

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Research article

Keywords: Cataract, Vision, Tibet, Quality of life, VRQOL

Posted Date: February 19th, 2020

DOI: <https://doi.org/10.21203/rs.2.23913/v1>

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Abstract

Background: Cataract is one of the most common blinding eye diseases, and patients' psychological, life and social activities will be significantly affected. Thus, the aim of this study is to assess the impact of cataract surgery on vision-related quality of life (VRQOL) in China's poor area Tibet. **Methods:** This study was a prospective cohort study. Subjects were invited to complete a validated questionnaire before and three months after cataract surgery. The 25-item National Eye Institute Visual Functioning Questionnaire (NEI VFQ-25) was used to assess the Vision-related quality of life. Generalized linear estimating equation (GEE) analysis and descriptive analyses were performed to record change of VRQOL before and after surgery. **Results:** One hundred and twenty-two patients were included. Among the One hundred and twenty-two patients, one hundred and seventeen (94.26%) completed the follow-up assessment after surgery. The total VRQOL was significantly improved after cataract surgery ($p < 0.001$). The item of stereopsis and Binocular contrast sensitivity were also related to changes in VRQOL. **Conclusions:** The majority of patients had significantly improved VRQOL after cataract surgery in Chinese population.

Background

It is predicted that the number of elderly patients with low vision will reach 150 million in the world, and cataract patients will account for 47% in 2020. Among them, cataract blind people in the 50–89 age group will account for 93% of all cataract blind people [1]. The prevalence of cataract in elderly people at the age of 60 is 25.79%, and the prevalence rate at age 80 is as high as 83.02% in China, which is one of the most common blinding eye diseases [2].

Many studies found that VRQOL will be significantly improved after cataract surgery [3–5]. However, most of the studies were conducted in developed countries, where visual impairment was minor before cataract surgery and patients had better financial conditions [6]. In fact, we should pay more attention to cataract patients in poor areas, because cataracts have a greater impact on their lives.

However, the impact of visual impairments on the quality of life after cataract surgery is unclear. Previous analyses of HRQoL assessments using generic instruments results in cataract subjects. Most studies show a strong correlation between binocular vision and VRQOL before cataract surgery. [7–9]. After cataract surgery, stereopsis was found to be strongest correlation with VRQOL, followed by binocular contrast sensitivity, while visual acuity shows only a weak correlation. But, other studies have suggested that changes in visual acuity and disability glare are related to changes of VRQOL, but not to contrast sensitivity [10].

The 25-item National Eye Institute Visual Functioning Questionnaire (NEI VFQ-25) which including emotional well-being and social functioning item is a reliable questionnaire performed to assess the influence of vision on quality of life. It is widely used in many countries of the world [11–15]. The Chinese version of NEI-VFQ-25 has been verified in Chinese population. The results suggest that the

questionnaire is an effective way to evaluate the vision-related quality of life of patients with eye diseases in China [16].

Due to conflicting evidence, the aim of this study was to assess the impact of cataract surgery on VRQOL using NEI-VFQ-25 in China.

Methods

This study was approved by the ethics committee of Eye hospital, Wenzhou Medical University. All patients signed informed consent. All study procedures according to the Declaration of Helsinki.

Study Design and Sample

A prospective cohort study was conducted between May 2019 and June 2019 in the Naqu, Tibet, China. All of the cataract patients who matched the inclusion criteria were invited to participate in this study. Patients were asked to complete the questionnaire before cataract surgery and again 3 months after cataract surgery.

The following demographic and clinical data were collected: gender, age, sex, ethnicity, marital status, live alone, education level

, currently employed, wears glasses, takes prescription medication, co-morbid condition.

Inclusion criteria for subjects were as follow: age > 40 years; age-related cataract need cataract surgery. Exclusion criteria were: can't understand questionnaire; diseases cause significant ocular conditions; other systemic diseases.

Questionnaire

The impact of visual impairment on vision-related quality of life was measured by NEI VFQ-25.

The trained technicians conduct NEI VFQ-25 interviews. The NEI VFQ-25 included 25 questions, patients' answers to each question were converted to 0–100 points, with higher the score mean the better. The scores were averaged to generate 12 subscale scores: Near Activities, Vision-Specific Dependency, Vision-Specific Social Functioning, General Health, Ocular Pain, Distance Activities, Vision-Specific Mental Health, Vision Specific Role Difficulties, General Vision, Driving, Color Vision, and Peripheral Vision.

Statistical analysis

Descriptive analyses were used to record the basic demographic characteristics of the population.

The influence of cataract surgery on the VRQOL score using generalised linear estimating equations (GEE) model. The GEE model was fitted for the 247 participants for whom complete before and after

surgery data were available. Time, visual acuity and contrast sensitivity(before or after surgery) was added to the model as an explanatory variable.

All statistical analyses used the SPSS 12.0 software (SPSS, Chicago, IL, USA). Significant difference set at P value < 0.05.

Results

A total of 122 cataract patients completed ophthalmic and physical examination before the cataract surgery and completed the questionnaire. Five cataract patients lost follow-up after cataract surgery. The final response rate was 95.1%.

At last, 117 subjects was recruited in this study, including 50 males. The mean age was 63 ± 8.5 years. The 99% patients were out of work. In terms of education, only 11% of patients completed junior high school education or higher education.

There was no significant differences between subjects who completed two questionnaires and those who only completed the questionnaire before surgery at baseline information, detail see Table 1.

Table 1

Demographic characteristics of participants who completed baseline (n = 122) and follow-up assessments (n = 117)

Variables	Baseline assessment		Follow-up assessment		p-value
	N	%	N	%	
Gender					0.98
female	72	59.02	70	59.83	
male	50	40.98	47	40.17	
Age (years)					
40 – 49	1	0.82	1	0.85	0.96
50 – 59	45	36.89	44	37.61	
60 – 69	58	47.54	56	45.90	
70+	18	14.75	16	13.68	
Marital status					
Married	46	37.70	45	38.46	0.99
Single/widow/divorced	76	62.30	72	61.54	
Ethnicity					
Tibetan	122	100	117	100	1
other	0		0		
Live alone					0.92
Yes	32	26.23	31	28.21	
No	90	73.77	86	71.79	
Education level					
Junior high school	13	10.66	12	10.26	0.94
Senior high school	1	0.82	1	0.85	
no	108	88.52	104	88.89	
Currently employed					0.99
No	1	0.82	1	0.85	
Yes	121	99.18	116	99.15	

Variables	Baseline assessment		Follow-up assessment		p-value
	N	%	N	%	
Takes prescription medication					0.95
no	45	36.89	43	36.75	
yes	77	63.11	74	63.25	
Co-morbid condition					0.93
no	23	18.85	21	17.95	
yes	99	81.15	96	82.05	

The NEIVFQ-25 scores for cataract patients before and after cataract surgery are showed in Table 2. Subjects with cataract have low HRQoL,

Table 2
Vision-related quality of life scores before and after cataract surgery (n = 117)

NEI-VFQ-25 Subscale	Before surgery		After surgery		p-value
	Mean	SD	Mean	SD	
General health	28.35	15.26	55.28	16.89	P < 0.0001
General vision	35.62	12.34	79.85	12.47	P < 0.0001
Ocular pain	75.69	10.25	83.26	13.26	P < 0.0001
Near activities	60.23	11.36	74.36	12.68	P < 0.0001
Distance activities	65.36	15.68	82.36	14.69	P < 0.0001
Vision specific					
Social functioning	78.59	14.23	89.36	12.57	P < 0.0001
Mental health	65.69	12.38	78.69	13.69	P < 0.005
Role difficulties	40.36	13.89	69.36	12.58	P < 0.0001
Dependency	65.36	12.47	89.68	13.25	P < 0.0001
Motorcycle/ moped riding	50.26	15.28	69.25	13.58	P < 0.0001
Color vision	88.36	10.69	95.36	16.57	P < 0.0001
Peripheral vision	46.35	10.25	65.36	10.09	P < 0.0001
Composite score	55.36	10.24	89.36	11.12	P < 0.0001

Table 3
Generalised linear estimating equation model of vision-related quality of life
after cataract surgery (n = 117)

Variable	Coefficient (SE)	95% confidence interval	pcvalue
composite score	15.25	12.69 - 19.35	P < 0.0001
Binocular visual acuity	3.24	1.23 - 5.42	0.34
Binocular contrast sensitivity	13.12	11.26 - 19.37	P < 0.0001
Stereopsis	-3.89	-5.23--3.24	P < 0.0001
Age	0.18	0.11 - 0.26	0.43
Gender	-2.34	-1.23--4.26	0.12
Lives alone	0.59	0.25 - 0.72	0.35
Married	-1.27	-0.68--2.69	0.15
Co-morbidity	3.27	1.45 - 5.27	0.24
Prescribed medication	2.35	1.27 - 4.69	0.47
employed	-1.38	-0.89--2.47	0.15
education	1.27	1.02 - 4.08	0.32

the lowest VRQOL subscale scores were general health, general vision, and peripheral vision before cataract surgery. However, all the VRQOL subscales scores were statistically significant improvements after surgery for participants.

The change in composite NEI VFQ-25 score after cataract surgery using GEE linear regression model was showed inTable 3.

It will improve 15 points in the VRQOL composite score postoperation after adjusting for potential confounders (p < 0.001). In addition, there were significantly associated with improvement in VRQOL in binocular contrast sensitivity and stereopsis after surgery, interesting, visual acuity was not.

The VRQOL score will improve 13 points if one log unit contrast sensitivity increased(p < 0.001). On the contrary, VRQOL score will decrease 3 points if increase one log in stereopsis (p < 0.001).

Discussion

To our knowledge, this is the first study comparing quality of life before and after cataract surgery inTibetan population. We found that NEIVFQ-25 scores for cataract patients were significant

improvement after cataract surgery. Others also found the same results that cataract surgery could significantly improve quality of life in Japan and the USA population [17, 18].

In general, NEIVFQ-25 is suitable for assessing the vision-related quality of life of cataract patients in China. Many questionnaires have been designed to measure quality-of-life in cataract patients, such as VF-14, 15-dimension generic instrument. However, these questionnaires do not focus on social functioning, mental health in cataract patients.

One advantage of the NEI VFQ-25 questionnaire is that it can measure the effects of visual impairments on mental health, role difficulties, social functioning and dependence. In addition, the Chinese version of the NEI-VFQ-25 had been verified and proposed modifications in Chinese population. It removed some redundant and poor targeting questions [19–22].

However, what needs to be noticed is that NEI VFQ-25 measures the combination of visual function and social emotional structure but lacks visual function evaluation. This may reduce the effectiveness of the composite score.

As we predicted, the scores of quality of life in cataract patients were very low before surgery. The lowest item were role difficulty and mental health. It means that cataract seriously affects the patient's mental health.

Visual impairment affects patients' daily activities, leading to reduced social interactions and further exacerbates patients' psychological symptoms. Fagers found that psychiatric symptoms will increase with decreased vision, but better as vision improved [23]. These results suggest that we should give more mental health attention to cataract patients.

We found that improvement in contrast sensitivity and stereopsis were related to improvement in VRQOL after cataract surgery, however, visual acuity was not associated with VRQOL. We further found that VRQOL score will improve 13 points if one log unit contrast sensitivity increased after adjusting for potential confounders. Previous research came to the same conclusion [6, 7]. The reason why contrast sensitivity affects quality of life is that contrast sensitivity is needed in everyday activities. This result suggested that we need to take contrast sensitivity and stereopsis into account when assessing the impairment caused by cataract.

We also found that the improvement in stereopsis was significantly associated with improved VRQOL after cataract surgery. However, previous studies rarely measured stereopsis when investigating the effects of cataract surgery on VRQOL. More and more research found that stereopsis is significantly associated with improvements in VRQOL.

A UK study found that the most strongly associated with changes in VRQOL after surgery was stereopsis [24]. Previous studies examining the impact of cataract surgery on VRQOL have seldom measured stereopsis, which was significantly associated with improved VRQOL. The studies from Spain

and Denmark also found the same results[25].The specific mechanism by which stereopsis affects quality of life is still unclear, we need to study further.

The advantages of this article was that it is the first to assess cataract surgery on VRQOL in Tibetan population. Tibet is one of most poor area in China. Previous studies have seldom included rural inhabitants, and more than 93% of patients in this study were rural residents. It is important to concern the impacted of cataract surgery on VRQOL in poor areas. Another advantage of this study is using GEE linear regression model to eliminate other factors which may affect the vision-related quality of life, such as co-morbidities including and medication usage.

Conclusions

Cataracts significantly affect patients' HRQoL. Our results showed that improves the HRQoL at 3 months after cataract surgery. We also found that the improvement in stereopsis was significantly associated with improved VRQOL after cataract surgery.

Abbreviations

Vision-related quality of life: VRQOL ; The 25-item National Eye Institute Visual Functioning Questionnaire: NEI VFQ-25

Declarations

Authors' contributions

J. Ni and X.Xu contributed to data acquisition

and analysis, and manuscript drafting. C.S.Tuand M.M. ZhuoMa were responsible for the conception and design of the study and critically revised the manuscript. All authors gave final approval of the submitted version and agreed to be accountable for all aspects of the work.

Funding

This research was supported by Zhejiang Scientific Program under Grant No. 2018C26007.

Availability of data and materials

Data will be available upon request by email.

Ethics approval and consent to participate

All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee (Research Ethics Committee of UFVJM,

2174074) and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. All subjects signed a written informed consent form before the beginning of this study.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests

Disclosure

The authors report no conflicts of interest in this work.

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