Psychological Effects of Foldable Capsular Vitreous Body Implantation in Patients with Impending Eye Atrophy

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Research Article

Keywords: Foldable capsular vitreous body, impending eye atrophy, psychological reconstruction, ocular trauma

Posted Date: September 27th, 2021

DOI: https://doi.org/10.21203/rs.3.rs-327015/v1

Abstract

Purpose: To investigate whether the FCVB could help improve the mental health of patients with impending eye atrophy.

Methods: Fifty-five patients who underwent FCVB implantation from 2017 to 2019 were screened to take part in this retrospective study. The researchers used independent third parties to distribute questionnaires, including the Hospital Anxiety and Depression Scale and the interpersonal sensitivity part of the Symptom Checklist 90 (SCL-90) scale to score the patients' depression, anxiety, and interpersonal sensitivity before and after surgery. Finally, 52 responses were collected.

Results: After FCVB implantation, patients had significantly better mental health and less depression, anxiety, and interpersonal sensitivity levels. Before FCVB implantation, 44.23% of patients with ocular trauma and retinal detachment were depressed, 48.08% were anxious, and 19.23% were sensitive to interpersonal communication. After FCVB implantation, 17.31% were depressed, 15.38% were anxious, and 9.62% were sensitive to interpersonal communication. However, baseline demographic and clinical data, such as age, gender, occupation, finance, pre-FCVB-implantation vision, number of surgeries before FCVB implantation, postoperative period length, and surgical satisfaction, had no significant effects on psychological scores of mental health before and after surgery ($P > 0.05$).

Conclusion: Mental health (depression, anxiety, and interpersonal sensitivity) significantly improved in patients after FCVB implantation.

Introduction

Severe ocular trauma and severe retinal detachment can cause visual impairment, blindness, atrophic bulbi, and even eye enucleation, all having a devastating impact on patients' psychology[1]. Indeed, the morbidity of depression, anxiety, and social phobia in people with visual impairment has been found to be higher than that of their peers[2]. Long-term discomfort, the various surgeries and changes to appearance, social settings, and occupational functioning affect the subjective well-being of patients, leading to some experiencing mental breakdown and even suffering suicidal tendencies[3]. Even when using a prosthetic eye, some feel severely or extremely severely stressed[4].

Therefore, a critical concern in patients with irreversible vision loss should be the improvement of their mental health. In the treatment of severe r etinal detachment(RD) and severe ocular trauma, silicone oil is one of the most common artificial vitreous substitutes used in the clinic, but it often contributes to concomitant complications, including cataracts, glaucoma, corneal degeneration, emulsification, and dependence[5-10]. Therefore, a new artificial vitreous substitute, foldable capsular vitreous body (FCVB), has been developed by the Zhongshan Ophthalmology Center, which can be used to assist in the treatment of severe ocular trauma and retinal detachment such as that due to retinal rupture or retinal choroidal hemorrhage, retinal or choroidal defect and incomplete retinal reattachment[11]. Further, it helps to avoid the complications caused by silicone oil, and it can also be used as a drug delivery system[5-10, 12-15]. FCVB has been proven to be safe, flexible, and effective in treating severe retinal detachment[13, 16-18]. After FCVB implantation surgery, the appearance of the eye can be significantly improved[5-10]. In patients whose vision loss is considered irreversible after various vitreoretinal surgeries, appearance may be a more important consideration.

Although previous studies have shown that ocular trauma and retinal detachment can affect patients’ mental health[19, 20], few studies have investigated whether a treatment can improve this outcome. Therefore, we conducted a retrospective, multicenter study to investigate changes in depression, anxiety, and interpersonal sensitivity before and after FCVB surgery using the interpersonal sensitivity dimension of Symptom Checklist 90 (SCL-90) scale and the Hospital Anxiety and Depression Scale (HADS).

Materials And Methods

Study Design and Participants

Fifty-five patients with impending eye atrophy were enrolled from Qilu Hospital of Shandong University, Weifang Eye Hospital, Jinan Mingshui Eye Hospital, Lunan Eye Hospital, and Jinan Eye Hospital from January 2017 to December 2019 based on the inclusion and exclusion criteria presented below.

Here are the criteria for inclusion: (1)18 to 70 years old man or woman; (2) vision in the treated eye < 0.05; (3) ocular axial length between 16 and 28 mm; (4) severe retinal detachment not amenable to treatment by current vitreous substitutes; and (5) informed consent provided by the patient or legal representative.

Here are the criteria for exclusion: (1) mental illness; (2) severe systemic disease; (3) other uncontrollable eye diseases; (4) allergy to silicone rubber or scar diathesis; (5) pregnancy or breast-feeding female; (6) researchers' consideration of patient unsuitability to participate in the clinical trial; or (7) refusal to provide informed consent.

Patients underwent FCVB implantation surgery (Guangzhou Vesber Co., Ltd, Guangzhou, China). Surgeries were performed by experienced ophthalmologists. Before inclusion, all patients were informed about the nature of the study and provided written informed consent. An independent third party was used to distribute the questionnaires, which were automatically collected to ensure that the information was accurate, credible, and not disturbed. Finally, 52 patient responses were collected (three were lost to follow-up).

The following preoperative information was collected for each patient: age, sex, occupation, time since FCVB surgery, vision, surgical history, satisfaction with surgery, and economic status. In order to assess mental health, we used the HADS and interpersonal sensitivity dimension of the SCL-90. Patients were asked to answer the HADS and the interpersonal sensitive dimension of SCL-90 twice, before and after FCVB implantation surgery.

Assessments and Questionnaires

HADS was used to assess anxiety and depression. The HADS includes 14 items, divided into two subscales of 7 items for anxiety (HADS-A) and 7 items for depression (HADS-D). Each item is scored on a four-point scale (0-3), with an aggregate score of 0-21 for each item. Previous researches have found that a score of 0 to 7 suggests no clinical anxiety or depression, 8 to 10 suggests possible clinical anxiety or depression, and 11 to 21 suggests clinical anxiety or depression[21].

Interpersonal sensitivity was assessed using the SCL-90. The SCL-90 was a self-report scale, including 90-item, and each item was assessed according to a five-point scale of distress (1 to 5) from 'not-at-all' to 'extremely'. Nine factors were tested, namely somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism. In our questionnaire, we chose the interpersonal sensitivity dimension from the above 9 factors of the SCL-90. The interpersonal sensitivity dimension mainly focuses on the lack of personal ability and low self-esteem. Especially when compared with others, they feel self-deprecating, uneasy feelings and obvious discomfort in interpersonal communication. The higher the score, the more clinical symptoms that indicate that the interpersonal relationship is sensitive.. A score >27 indicates that the individual is sensitive to interpersonal relationships. A score <18 indicates normal interpersonal relationships[22, 23].

Statistical Analyses

Statistical analyses were performed using IBM SPSS Statistics, version 20 (IBM Copatron, NY, USA). For descriptive data analyses, count data are described by frequencies and proportions, and measurement data described by means and standard deviations. Paired t-tests (or Wilcoxon signed-rank tests) were used to compare preoperative and postoperative data. Categorical data were carried out with chi-square test or Fisher's exact test. Repeated-measures analysis of variance was used to analyze the relationships between factors and scores before and after surgery. For all analyses, the significance level was set to 0.05.

Results

Descriptive Data of the Study Population

A total of 52 patients were ultimately enrolled in this study. Table 1 shows the patients' major demographic and clinical characteristics. Most patients were men (86.5%), had a low level of education (53.8% below high school), were in poor economic conditions (25.0% had an annual income <RMB 30,000) and were former smokers (59.6%). A total of 13 participants (25.0%) reported hypertension or stroke, and two individuals (8.0%) reported having diabetes.

Table 1

Participants' demographic and clinical data

Variable	No	%
Age		
<21	6	11.54
21~30	3	5.77
31~40	14	26.92
41~50	13	25.00
51~60	11	21.15
61~70	5	9.62
Total	52	100
Sex		
Male	45	86.54
Female	7	13.46
Total	52	100
Time		
1-3 months	9	17.31
4-6 months	11	21.15
7-9 months	5	9.62
10-12 months	2	3.85
> 1 year	21	40.38
> 2 years	4	7.69
Total	52	100
Pathogeny		
Ocular trauma	47	90.38
Retinal detachment	4	7.69
Other (lost)	1	1.92
Total	52	100
Satisfaction		
Dissatisfied	3	5.77
General satisfied	8	15.38
Satisfied	23	44.23
Very satisfied	18	34.62
Total	52	100
Vision		
NLP	20	38.46
LP	21	40.38

HM	7	13.46
FC	4	7.69
Total	52	100
Economic Burden		
None	10	19.23
A little	27	51.92
A lot	11	21.15
Cannot afford	4	7.69
Total	52	100

Changes in Psychological Scores before and After Surgery

There were strong differences in psychological scores for depression, anxiety, and interpersonal sensitivity before and after FCVB implantation. Table 2 summarizes and compares the patients' psychological scores before and after surgery. The mean HADS-A scores at baseline before and after surgery were 20.19±9.17 and 7.00±4.30, respectively, while the mean HADS-D scores were 9.88±6.03 and 6.58±4.46, respectively. The mean interpersonal sensitivity scores before and after surgery were 20.19±9.17 and 16.38±7.92, respectively. The HADS-A score was significantly lower after surgery than they were before surgery (P<0.001). The HADS-D was significantly lower after surgery than they were before surgery (P<0.001). Interpersonal sensitivity was significantly lower after surgery than it was before surgery (P<0.001).

Table 2

Hospital anxiety and depression scores (HADS) and interpersonal sensitivity of SCL-90 of patients prior to and after FCVB implantation surgery

		Pre-Surgery		Post- Surgery	
		N	%	N	%
Depression	0-7	21	40.38%	35	67.31%
	8-10	8	15.38%	8	15.38%
	>10	23	44.23%	9	17.31%
Anxiety	0-7	14	26.92%	31	59.62%
	8-10	13	25.00%	13	25.00%
	>10	25	48.08%	8	15.38%
Interpersonal sensitivity	0-18	24	46.15%	36	69.23%
	19-27	18	34.62%	10	19.23%
	>27	10	19.23%	5	9.62%

Number (%) of patients scoring in categories 'No case' (< 7), 'Possible clinical case' (8–10) and 'Clinical case' (> 10) on the Hospital Anxiety and Depression Subscales. Number (%) of patients scoring in categories 'No case' (0-18), 'Possible clinical case' (19–27) and 'Clinical case' (> 27) on the SCL-90 [21-23].

Table 3

Psychological scores before and after surgery

	Pre-operation (Mean SD)	Post-operation (Mean SD)	95% CI		P-value**
			Lower	Upper	
HADS Total					
Depression	9.88±6.03	6.58±4.46	1.802	4.813	0.000053
Anxiety	10.4±4.65	7.00±4.30	2.061	4.747	0.000005
SCL-90					
Interpersonal Sensitivity	20.19±9.17	16.48±7.922	1.968	5.647	0.000124

Table 4

Association between psychological status and demographic characteristics (n = 52)

	P-value								
	Age	Sex	Job	Vision pre-surgery	Pathogeny	Number of surgeries	Economic burden	Satisfaction	Postoperative time
Depression before and after surgery	0.917	0.815	0.160	0.640	0.505	0.068	0.699	0.849	0.228
Anxiety before and after surgery	0.953	0.127	0.356	0.903	0.203	0.434	0.233	0.513	0.721
Interpersonal Sensitivity before and after surgery	0.902	0.746	0.457	0.974	0.186	0.469	0.169	0.467	0.720

Association between Demographic Factors and Psychological Status

No significant association was found between demographic characteristics and changes in psychological status pre- and postoperatively. Table 4 presents the relationship between various possible influencing factors and psychological scores. Gender (P> 0.05), age (P> 0.05), occupation (P> 0.05), postoperative time (P> 0.05), preoperative vision (P> 0.05), surgical satisfaction (P> 0.05), economic conditions (P> 0.05), or other factors did not have an effect on the psychological scores of depression, anxiety, and interpersonal sensitivity before or after surgery.

Discussion

This investigation reported the psychological impact of FCVB implantation in patients with impending eye atrophy caused by ocular trauma and recurrent retinal detachment. The HADS and interpersonal sensitivity of the SCL-90 were used to assess and follow-up the patient's psychological status and to prove that the FCVB implantation operation was conducive to the improvement of patients' mental health.

Ocular trauma and severe retinal detachment are usually acute conditions for which surgery cannot prevent severe and permanent visual loss. FCVB implantation was used to prevent atrophic bulbi and impending eye atrophy. Before FCVB implantation, nearly half of the patients with ocular trauma and recurrent retinal detachment experienced probable levels of depression (44.23%) and anxiety (48.08%). Some experienced interpersonal sensitivity (19.23%) prior to FCVB implantation, less than the ratio of anxiety or depression. After FCVB implantation, 17.31% were depressed, 15.38% were anxious, and 9.62% were sensitive to interpersonal relationships. Compared with levels before FCVB implantation, all scores after FCVB implantation were significantly reduced. This is the first study to show that FCVB could recover patients' depression, anxiety, and interpersonal sensitivity, and to demonstrate that patients' worsened psychological symptoms were consistently associated with ocular trauma and severe retinal detachment.

Severe retinal detachment and accidental ocular trauma causes visual impairment and inconveniences to life and social activities, resulting in a a negative impact on the quality of life, social interaction, and psychological function[24]. Most patients said they preferred to stay at home rather than go out. In addition, all patients had undergone several previous surgeries such as vitreoretinal surgery or silicone oil filling before FCVB implantation, which also had a certain psychological impact, especially after discovering that these operations could not improve their vision and even aggravated their pain. Among all possible negative emotions, we used depression, anxiety, and interpersonal sensitivity as representative measures, since they directly or indirectly affect treatment and recovery.

Although vision could not be repaired after FCVB implantation, the patients' long-term discomfort was reduced and their appearance was improved, making it easier for patients to adapt to life after visual impairment. A study showed that 6 months after surgery, the eyes kept symmetrical and normal[25], thereby reducing their depression, anxiety, and interpersonal sensitivity, all conducive to their psychological improvement. The decrease in scores proved that FCVB implantation was beneficial to patients' psychological reconstruction.

We also investigated possible demographic influencing factors. Intuitively, factors such as economic status, surgical satisfaction, and postoperative time may influence anxiety, depression, and interpersonal sensitivity levels before and after surgery. However, our study found no significant relation between psychological scores and factors such as age, gender, occupation, finance, pre-FCVB-implantation vision, number of surgeries before FCVB implantation, postoperative period length, and surgical satisfaction ($P > 0.05$).

In addition, our survey showed that for most patients' families, the cost of FCVB implantation was affordable, because almost all patients had medical insurance or compensation for work-related injuries. The economic pressure was more due to job changes caused by visual disability after onset of the disease, since some patients were unable to work in their previous industry.

Our findings also support previous studies that identified links between severe retinal detachment and mental health and between severe ocular trauma and mental health. Ophthalmic operations and other ophthalmic diseases, such as diabetic retinopathy and age-related macular degeneration, have also been proven to damage patients' mental health[26-31][1, 32-34]. Compared with previous studies, the anxiety and depression of patients with traditional retinal detachment surgery (vitrectomy or buckling) were more serious after surgery, whereas FCVB improved patient psychology[1].

We believe that doctors should pay more attention to patients' mental health. The median age of our sample was 41-50 years, and male patients were more common. Since the vast majority of participants (90.38%) were < 60 years old, probably economically active, and the main source of family income, FCVB contributed to their psychological wellbeing, which would have a positive effect on the whole family or society.

There are some limitations to our research. First, this was a retrospective study. Preoperative psychological scores of patients were biased to a certain extent, which may lead to recall bias. Another major limitation of this study was the relatively small number of patient responses. The inclusion and exclusion criteria of our study were very strict, which limited the sample size. In future studies, we want to collaborate with more hospitals to obtain larger sample sizes. In addition, we lacked a control

group of patients with silicone oil tamponade for a long time or patients with artificial eyes. Larger samples and control groups are needed to further study the psychological effects of FCVB implantation.

For patients with impending eye atrophy unable to improve their vision, the improvement of their mental health is worthy of attention since it helps patients partially restore their daily lives and social functions and improve their quality of life. Further research should evaluate various psychosocial aspects of patients with FCVB implantation to provide patients with suitable therapeutic interventions.

Declarations

Funding sources:

This study was funded by Key Research and Development project of Shandong Province 2017GSF218033.

Author contribution:

All authors attest that they meet the current ICMJE criteria or Authorship. Zheyi Shao and Chao Huang designed the questionnaire, collected data and drafted the manuscript. Ying Zhang and Shanshan Li performed the statistical analysis and interpreted data. Donglin Wang, Yu Wang, Huiru Lin and Xianyong Sun collected data from different hospitals and distributed questionnaires. Fang Zhou and Jianqiao Li conceived and designed the study. All authors have read, critically revised and approved the current version of the manuscript.

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