Clinical Ophthalmology

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ORIGINAL RESEARCH

The Effects of Implantable Collamer Lens ICL Implantation in High Myopia Patients' Mental Health

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Purpose: To investigate the psychological changes in patients pre and post implantable collamer lens (ICL, EVO) implantation surgery in the posterior chamber.

Patients and methods: Self-rating anxiety scale (SAS) and self-rating depression scale (SDS) were used to assess the mental states of 43 patients who underwent ICL implantation surgery performed by the same surgeon between January 2021 and December 2022.

Results: Comparing the results before and one week after the operation, there is a significant difference in both the SAS scale ($P<0.05$) and the SDS scale ($P<0.05$). Similarly, when comparing the pre-operation and one-month post-operation results, there is also a significant difference in both the SAS scale ($P<0.05$) and the SDS scale ($P<0.05$). However, when comparing the one-week post-operation and one-month post-operation results, there is no significant difference in either the SAS scale ($P>0.05$) or the SDS scale ($P>0.05$). Moving on to the comparison between the pre-operation results and the national norm level, there is a significant difference in both the SAS scale ($P<0.05$) and the SDS scale ($P<0.05$). When comparing the one-week post-operation results and the national norm level, there is a significant difference in the SAS scale ($P<0.05$). Similarly, when comparing the one-month post-operation results and the national norm level, there is a significant difference in the SAS scale ($P<0.05$).

Conclusion: After undergoing ICL implantation surgery, patients typically experience a notable decrease in anxiety (SAS) and depression (SDS) scales. These improvements gradually stabilize and enhance during the postoperative recovery period. However, it may require a significant amount of time for patients to fully restore their psychological well-being to levels comparable to the national norm, particularly in terms of anxiety levels.

Keywords: implantable collamer lens implantation, myopia, mental state, self-rating anxiety scale, self-rating depression scale

Introduction

The implantable collamer lenses (ICL) is a type of phakic intraocular lens (IOL) that is implanted in the posterior chamber and fixed in the ciliary sulcus.[1,2] In the recent years, it has gained wide acceptance in implantation surgery. The ICL implantation surgery offers a minimally invasive surgical option with small incisions, a large correction range, high predictability, stability, and reversibility. It helps to avoid the rebound of refractive error caused by the proliferation of corneal cells.[3] This treatment method has significantly improved the quality of life for patients with refractive errors such as myopia, hyperopia, and astigmatism.[4,5]

ICL implantation surgery involves the insertion of a small biocompatible lens into the eye, which can correct refractive errors and significantly improve visual acuity. However, despite the numerous benefits of this procedure, there have been reports of potential risks such as glaucoma, angle closure, cataract formation, and corneal endothelial decompensation.[6] These risks can have psychological impacts on patients, affecting their quality of life and potentially leading to mental disorders like anxiety and depression.[7,8] Consequently, accurately assessing the effectiveness of treatment can be hindered.[9]

Although previous research has predominantly focused on the physical effects of ICL surgery, our study aims to explore the psychological effects, specifically examining levels of anxiety and depression. The objective of this study is

Received: 3 November 2023
Accepted: 4 January 2024
Published: 11 January 2024

to establish a clearer understanding of the relationship between ICL implantation and patients' psychological well-being by comparing patients' anxiety and depression scores at different time intervals and juxtaposing them with national norms level.[10] Scores exceeding the national norm indicate a higher level of anxiety and depression compared to an average adult.

Materials and Methods

Subjects

A total of 43 patients (n=43) underwent EVO Visian ICL implantation surgery at the Second People's Hospital of Foshan between 2021 and 2022. The surgeries were performed by the same experienced surgeon. Out of the 43 patients, 10 were males (23.3%) and 33 were females (76.7%). The average age of the patients was 25.31±4.87 years old, with a range of 18 to 39 years old.[11]

The inclusion criteria for this study were as follows: (1) Patients who provided informed consent; (2) Patients with a minimum anterior chamber depth of 2.8mm, normal intraocular pressure (10~21mmHg), open anterior chamber angle, and corneal endothelial cell count of more than 2000 cells/mm²; (3) Patients with clear lenses, no active eye inflammation, and no other eye diseases; (4) Patients with no history of eye surgery; (5) Patients with no progressive keratoconus; (6) Patients with no history of retinal tear, uveitis, glaucoma, retinal detachment, or family history of these conditions, and with stable refractive status for more than one year; (7) Patients without severe underlying diseases such as malignant tumors, mental abnormalities, immune system diseases, blood system diseases, heart disease, abnormal liver and kidney function; (8) Patients in special periods such as pregnancy, lactation, and postpartum were also excluded. (9) Patients discontinued wearing contact lenses for a duration exceeding 7 days. This study adheres to the principles of the Helsinki Declaration.

Methods

Surgical Procedure

Prior to the procedure, the pupil was dilated to a diameter of at least 8mm. Using a microscope, the horizontal white-to-white (WTW) measurement was taken again with a caliper. A clear corneal incision was made at the twelve o'clock position. A viscoelastic substance was then injected into the anterior chamber, and the ICL (ICL Model EVO; STAAR Surgical, Monrovia, CA, USA), was implanted into the anterior chamber, with 4 haptics inserted behind the iris. Following pupil dilation with a mydriatic, a 3mm temporal incision was performed at the peripheral cornea. The viscoelastic substance was then flushed out from the anterior chamber using a single cannula, and the incision was sealed.

Diagnostic Tests

Objective measurements including subjective refraction, axial length, corneal thickness, corneal endothelium, intraocular pressure, and PENTACAM anterior chamber depth were collected and analyzed. Preoperative indicators for all patients were within the inclusion criteria for this study, as presented in Table 1.[11] All patients achieved their CDVA (corrected distance visual acuity) after surgery.

Observations

All patients underwent mental state assessments using the Self-Rating Anxiety Scale (SAS) and Self-Rating Depression Scale (SDS) before surgery, one week after surgery, and one month after surgery.[12] Additionally, ophthalmology-related examinations were conducted after surgery. To avoid implicating the patient's SAS and SDS scores, preoperative surveys are collected before the surgical consultation indicating that discussions about surgical risks and precautions with the patient have not taken place yet.

The Self-Rating Anxiety Scale (SAS) is a self-rating scale developed by Zung in 1971 to measure anxiety emotions.[13] It consists of 20 items, with each item corresponding to an anxiety symptom. Participants rate their experience on a scale of 1 (almost none) to 4 (all the time). The total score helps classify the individual's anxiety level, enabling clinicians to understand the anxiety symptoms the patient may experience before or after ICL implantation.

Table 1 Clinical Characteristics and Refractive Parameters of Patients Undergoing ICL Implantation

	Mean ± SD	Range [Min, Max]
Age (years)	25.22±4.53	[18, 36]
Sphere (D)	−9.50±2.90	[−20, −4]
Cylinder (D)	−1.53±0.87	[−3.75, 1]
Axis (degrees)	124.46±72.65	[2, 180]
CDVA	1±0.12	[0.6, 1.2]
Axial length	27.46±1.49	[24.96, 32.68]
Corneal thickness (um)	540.86±34.05	[472, 626]
Corneal endothelium	2861.54±217.57	[2085.1, 3286.5]
Intraocular pressure (mmHg)	15.20±2.79	[10.3, 21.7]
PENTACAM anterior chamber depth (mm)	3.22±0.24	[2.82, 3.76]
Length of wearing spectacle (year)	13.21±5.13	[5, 29]
Length of wearing contact lens (year)	3.06±4.46	[0, 20]

Notes: Visual acuity of 1.0 is equivalent to 20/20 on Snellen chart.
Abbreviations: SD, standard deviation; CDVA, corrected distance visual acuity.

Similarly, the Self-Rating Depression Scale (SDS) is a self-rating scale also developed by Zung in 1965 to measure depressive symptoms.[14] It includes 20 items, and respondents rate the frequency of their experiences with depression on a scale of 1 (rarely occurs) to 4 (occurs most of the time). The total score reflects the severity of depressive symptoms and provides insight into the patient's mental health during ICL implantation.

The use of these scales is especially important when considering ICL implantation. This is because the anticipation of surgery, the surgery itself, and the postoperative recovery period can elicit strong emotional responses, such as anxiety and depression, in patients.[14] Therefore, it is crucial to regularly monitor the mental health status of patients both before and after surgery to achieve optimal treatment outcomes.

Results

Overall Results

Comparing the results before and one week after the operation, there is a significant difference in both the SAS scale ($t=2.039$, $P<0.05$) and the SDS scale ($t=2.861$, $P<0.05$). Similarly, when comparing the pre-operation and one-month post-operation results, there is also a significant difference in both the SAS scale ($t=2.345$, $P<0.05$) and the SDS scale ($t=3.088$, $P<0.05$). However, when comparing the one-week post-operation and one-month post-operation results, there is no significant difference in either the SAS scale ($t=0.248$, $P>0.05$) or the SDS scale ($t=0.116$, $P>0.05$). Moving on to the comparison between the pre-operation results and the national norm level,[10] there is a significant difference in both the SAS scale ($t=4.502$, $P<0.05$) and the SDS scale ($t=2.98$, $P<0.05$). When comparing the one-week post-operation results and the national norm level, there is a significant difference in the SAS scale ($t=2.315$, $P<0.05$), but not in the SDS scale ($t=0.203$, $P>0.05$). Similarly, when comparing the one-month post-operation results and the national norm level, there is a significant difference in the SAS scale ($t=2.135$, $P<0.05$), but not in the SDS scale ($t=0.098$, $P>0.05$). As presented in Table 2.[11]

Table 2 Psychological Assessment Scores Before and After Surgery: Comparison with National Norm Level

	n	SAS Scale [Mean ± SD]	SDS Scale [Mean ± SD]
Pre-operation	43	40.58±7.92	48.23±9.17
One-week post-operation	43	37.18±7.54	42.33±9.94
One-month post-operation	43	36.79±7.04	42.09±9.27
National Norm Level	43	33.80±5.90	41.88±10.57

Notes: Data Shown as mean ± standard deviation.
Abbreviations: SD, standard deviation; SAS, Self-Rating Depression Scale; SDS, Self-Rating Depression Scale.

Discussion

With the recent development of clinical treatment approaches, there has been an increased recognition of the significance of psychological impact on surgery and post-operative recovery.[15–17] Clinical treatment now encompasses not only physical condition but also mental health.[18] However, it is important to note that there is currently limited research on the psychological status of ICL patients, warranting further clinical studies for a more comprehensive exploration of this topic.

This study aims to delve into the psychological experiences of patients undergoing ICL implantation surgery, specifically focusing on their levels of anxiety and depression before and after the surgical intervention. The findings suggest a general association between ICL implantation and levels of anxiety and depression, shedding light on the emotional journey that patients go through during the surgical process.

Prior to the ICL implantation surgery, patients often experience heightened levels of anxiety and depression, which can be attributed to various factors. These factors include the fear of the surgical procedure itself, apprehension about potential adverse outcomes, and a lack of trust in the surgical team.[19,20] These psychological responses align with existing research that emphasizes the significant psychological burden that surgical candidates often bear.[21] It is crucial to acknowledge and address these pre-operative anxieties in order to enhance patients' psychological well-being and optimize their overall surgical experience.[20,22]

After the surgery, the patients experienced a notable reduction in anxiety and depression with the depression index gradually approaching national normal levels. This positive change can be attributed to the improved quality of life resulting from the surgical intervention. The restoration of vision, the elimination of concerns about surgical risks, and better engage in sports activity play a significant role in this positive transformation.[20,23,24] These findings also emphasize the psychological benefits of successful ICL surgical outcomes, underscoring the interconnectedness of physical and psychological well-being.

During the postoperative recovery period, the anxiety and depression indices continue to decline gradually, suggesting an improvement in patients' emotional well-being as they adjust to life after their ICL implantation surgery. However, our observations reveal a significant difference in the anxiety index compared to the national norm level ($P>0.05$). Several factors contribute to this persistent anxiety, including patient concerns or dissatisfaction with the surgical results, apprehension about potential postoperative recurrence, nigh vision symptoms, and the process of adapting to a glasses-free life.[19,23] Additionally, patients may experience mild physical discomfort such as eye irritation, glare, and dryness, which can initially worsen during the first 1–4 weeks and persist for 6–12 months. It was noted that providing psychological explanations and support, especially in the absence of abnormal eye conditions, helped stabilize patients' emotions and alleviate discomfort symptoms.[14]

The insights garnered from this study hold implications for both clinical practice and research. In clinical practice, clinicians should acknowledge the significant psychological burden experienced by patients before undergoing ICL implantation surgery and develop interventions to alleviate pre-operative anxiety and depression. Moreover, the study also highlights the significant impact of ICL surgical outcomes on patients' emotional well-being after surgery. Additionally, the prolonged presence of anxiety during the recovery period emphasizes the importance of providing personalized psychological support throughout the postoperative phase.

One of the limitations of this study is that the majority of patients who underwent a successful ICL implantation surgery were young individuals with high myopia and the sample size was relatively small, which may limit the generalizability of the research findings. Future studies should consider employing larger sample sizes and incorporating a control group. Furthermore, investigating the efficacy of various psychological support strategies in alleviating postoperative discomfort and anxiety after ICL implantation surgery would be a promising area for further exploration.

Conclusion

In conclusion, this study emphasizes the dynamic nature of patients' psychological experiences before, during, and after ICL implantation surgery. By recognizing these emotional trajectories and addressing patients' concerns, clinicians can improve the overall surgical experience and contribute to patients' well-being.

Data Sharing Statement

Data supporting the results reported in the manuscript can be found: https://data.mendeley.com/datasets/t6pmbvkvtd/2.

Ethics Approval and Informed Consent

The research has received approval from the Second People's Hospital of Foshan ethics committee (2022)-0091 and has been conducted in compliance with ethical guidelines established in the 1964 Declaration of Helsinki, as well as subsequent amendments, or equivalent ethical standards.

Consent for Publication

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.

Funding

This study was funded by Research and analysis of corneal biomechanical characteristics before and after phakic posterior Visian implantable collamer lens (ICL) implantation, Grant number: 20230333. This study was also funded by Foshan City "14th Five-Year Plan" Medical Key Specialty Construction Project, Grant number: FSGSP145064. This trial was conducted and data collected with complete independently from other researchers.

Disclosure

The authors have no conflict of interest to declare

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