World Journal of Clinical Cases

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World J Clin Cases 2024 July 6; 12(19): 3882-3889

DOI: 10.12998/wjcc.v12.i19.3882

ISSN 2307-8960 (online)

ORIGINAL ARTICLE

Randomized Clinical Trial

Effect of capsule treatment on visual acuity and quality after phacoemulsification lens implantation in myopic patients with cataract

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Specialty type: Ophthalmology

Provenance and peer review: Unsolicited article; Externally peer reviewed.

Peer-review model: Single blind

Peer-review report's classification

Scientific Quality: Grade C

Novelty: Grade C

Creativity or Innovation: Grade B

Scientific Significance: Grade B

P-Reviewer: Kayapanda M, India

Received: April 10, 2024

Revised: May 10, 2024

Accepted: May 20, 2024

Published online: July 6, 2024

Processing time: 79 Days and 4.3 Hours

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Abstract

BACKGROUND

Cataracts pose a significant clinical burden due to their complex pathogenesis. In recent years, an increase in cataracts coexisting with myopia has heightened the incidence of retinopathy and posterior vitreous detachment. Additionally, symptoms of ocular axis elongation, lens nucleus hardening, and vitreous liquefaction have become more prevalent. While conventional extracapsular cataract extraction is commonly employed, it often yields suboptimal visual outcomes. Subsequent advancements in cataract phacoemulsification and lens implantation surgeries have gained widespread acceptance for their ability to improve refraction and significantly improve uncorrected visual acuity.

AIM

To investigate the effect of capsular treatment after phacoemulsification lens implantation in myopic patients with cataract.

METHODS

We selected 110 patients (with 134 eyes) with myopia and cataracts treated. These patients were categorized into two groups: an observation group (57 patients with 70 eyes) and a control group (53 patients with 64 eyes). The control group underwent cataract phacoemulsification and lens implantation, while the observation group received a refined capsular treatment based on the control group's procedure. We assessed the differences in visual acuity and quality between the two groups before and after surgery.

RESULTS

At six months post-operation, the observation group exhibited significantly improved far vision, intermediate vision, near vision, lower objective scattering index, higher Modulation transfer function cut-off frequency, and overall vision

metrics at different contrast levels (100%, 20% and 9%) compared to the control group ($P < 0.05$). The total score of the National Eye Institute Visual Function Questionnaire in the observation group at 6 months after operation was significantly higher than that in the control group ($P < 0.05$). No significant difference in the incidence of adverse reactions was observed between the observation group and control group ($P > 0.05$).

CONCLUSION

Capsular treatment demonstrates efficacy in improving visual acuity and quality after phacoemulsification lens implantation in myopic patients with cataracts, warranting its clinical application.

Key Words: Capsular treatment; Myopia; Cataract; Phacoemulsification and lens implantation; Visual acuity; Visual quality; Uncorrected visual acuity

Core Tip: This study attempted to observe the application value of capsular membrane treatment in myopia with cataract phacoemulsification crystal implantation. The observation indicators included patients' visual acuity and visual quality, and the preliminary study results found that it had certain clinical application value.

Citation: Liu W, Liu Q, Zhou F, Feng B, Wu WL. Effect of capsule treatment on visual acuity and quality after phacoemulsification lens implantation in myopic patients with cataract. *World J Clin Cases* 2024; 12(19): 3882-3889
URL: https://www.wjgnet.com/2307-8960/full/v12/i19/3882.htm
DOI: https://dx.doi.org/10.12998/wjcc.v12.i19.3882

INTRODUCTION

Cataracts pose a significant clinical burden due to their complex pathogenesis[1]. In recent years, an increase in cataracts coexisting with myopia has heightened the incidence of retinopathy and posterior vitreous detachment. Additionally, symptoms of ocular axis elongation, lens nucleus hardening, and vitreous liquefaction have become more prevalent[2,3]. While conventional extracapsular cataract extraction is commonly employed, it often yields suboptimal visual outcomes [4,5]. Subsequent advancements in cataract phacoemulsification and lens implantation surgeries have gained widespread acceptance for their ability to improve refraction and significantly improve uncorrected visual acuity[6,7].

However, recent studies have identified postoperative complications, such as changes in intraocular lens (IOL) position, eccentric lens displacement, and posterior capsule clouding, associated with residual lens epithelial cells on the capsule membrane[8,9]. Despite clinical consideration given to removing lens epithelial cells to improve these complications, a critical gap remains in understanding the optical approach for effective capsular membrane treatment. This knowledge gap necessitates further exploration to refine capsular membrane treatment through meticulous anterior and posterior capsular membrane polishing[10,11]. This study aims to perform capsular membrane treatment during conventional phacoemulsification and lens implantation surgery. Our objective is to investigate the effectiveness of this approach in treating patients with myopia and cataracts by observing its effects on visual acuity and quality and potential adverse effects to provide a basis for the clinical selection of the optimal solution for enhancing visual outcomessuch cases.

MATERIALS AND METHODS

General information

We selected 110 patients with 134 eyes diagnosed with myopia and cataracts treated at our hospital from January 2020 to January 2022. The inclusion criteria were: (1) Patients with an eye axis length ≥ 26 mm and diopter ≥ -6.0 D; (2) corneal astigmatism ≤ 1.00 D and Kappa angle < 0.4 mm; (3) cataract nuclear hardness conforming to grades II to IV in Emery's classification[12]; and (4) Informed consent from both patients and family members. The exclusion criteria were as follows: (1) Traumatic cataract, congenital cataract; (2) previous history of ocular surgery; (3) other ocular diseases such as retinal detachment, macular degeneration, and uveitis; and (4) concurrent serious diseases such as combined malignant tumours, liver and kidney diseases, and other important organ diseases. Patients were grouped by envelope method and divided into an observation group with 57 cases and 70 eyes and a control group with 53 cases and 64 eyes. Both groups' comparative clinical general information is presented in Table 1, indicating comparability. The study was approval by the hospital ethics committee.

Treatment and follow-up method

Both groups underwent cataract phacoemulsification and lens implantation treatment. The control group underwent routine surgery without capsule treatment, while the observation group underwent refined capsule treatment during the

Table 1 Comparison of clinical general data between the observation group and control group

Group	Cases	Sex		Age (yr)	Body mass index (kg/m²)	Axial length of eyeball (mm)	Diopter (D)	Emery grade (number of eyes)		
		Male	Female					II	III	IV
Observation group	57	32 (56.14)	25 (43.86)	65.59 ± 9.92	22.19 ± 2.04	26.76 ± 1.21	-4.20 ± 0.88	10 (14.29)	34 (48.57)	26 (37.14)
Control group	53	33 (62.26)	20 (37.74)	64.40 ± 9.17	22.04 ± 2.31	26.80 ± 1.09	-4.12 ± 0.90	8 (12.50)	31 (48.44)	25 (39.06)
t/χ^2		0.426		0.652	0.362	-0.182	-0.471	0.112		
P value		0.514		0.516	0.718	0.856	0.638	0.946		

therapy.

In the observation group, a 2.8 mm long clear corneal incision was made at 11:00, and an appropriate amount of viscoelastic was injected into the anterior chamber with promethaine hydrochloride used for surface anesthesia. A lateral incision of 1 mm in length was made at the 3:00 position. After adequate water separation, a continuous circular tear of approximately 5.5 mm diameter was performed using capsular tear forceps. Phacoemulsification was then conducted by placing the ultrasonic emulsification needle in the center of the capsular bag to complete the emulsification of the nuclear mass and aspirate cortex while immobilizing the needle. An IOL was implanted into the capsular bag, and a small amount of viscoelastic material was injected into the bag to bulge the posterior capsular membrane. The posterior capsule was polished using an IF-8208 capsule polisher to remove any remaining lens epithelial cells on the capsule. The IOL forms a symmetrical extension within the capsular bag, straining the posterior capsule and increasing the contact between the IOL optical surface and the posterior capsule, creating a mechanical "barrier" between them. The anterior chamber and capsular bag were filled with viscoelastic materialand the 360°anterior capsular membrane was polished through the main and lateral incisions, respectively. The Tecnis ZMB00 IOL was implanted in the capsular bag, and the residual viscoelastic material was aspirated from the anterior chamber.

Inspection method

The following assessments were conducted 6 months postoperatively: (1) Visual acuity assessment[13]: The naked eye visual acuity was measured at distances 5 m (far), 80 cm (middle), and 40 cm (near) using an international standard visual acuity chart. A lower measured value indicates better visual acuity; and (2) Objective visual quality examination[14]: The modulation transfer function cut-off frequency (MTF cut-off), objective scattering index (OSI), and OQAS value (OV) at three contrast levels (100%, 20%, and 9%), were measured using the OQAS II system.

Postoperative IOP elevation and accidental rupture of the capsular membrane were also observed.

Evaluation tool

The Chinese version of the 25-item National Eye Institute Visual Functioning Questionnaire (NEI-VFQ-25) was used to assess the vision-related quality of life of the patients. It encompasses items on general health, general vision, eye pain, near work, and distance work, with a total score of 100, with lower scores indicating poorer vision-related quality of life [15].

Statistical treatment

The data were analyzed using SPSS software version 22.0. Measurement data included age, body mass index, and ocular axis length, were expressed as mean ± SD. The *t*-test was used to analyze the differences in indicators between groups. Sex and Emery classification, expressed by *n* (%), were considered as count data, while the chi-square was used to analyze the difference in indicators between groups. Statistically significant was set at $P < 0.05$ for comparing indicators between groups.

RESULTS

Comparison of visual acuity before and after surgery

Both groups' visual acuity improved six months after surgery compared to before surgery ($P < 0.05$). Additionally, the far vision, middle vision, and near vision in the observation group at six months after surgery were lower than those in the control group ($P < 0.05$) (Table 2).

Comparison of objective visual quality between both groups before and after surgery

The objective visual quality at six months postoperatively improved in the observation and control groups compared with the preoperative period ($P < 0.05$). Specifically, the OSI at six months postoperatively in the observation group was significantly lower than that in the control group ($P < 0.05$), while the MTF cut-off, 100% OV, 20% OV, and 9% OV were significantly higher than those in the control group ($P < 0.05$) (Table 3).

Table 2 Comparison of visual acuity between the two groups before and after operation

Index	Observation group (70 eyes)	Control group (64 eyes)	*t*	*P* value
Far vision				
Preoperative	0.21 ± 0.04	0.20 ± 0.05	1.283	0.202
6 months after operation	0.08 ± 0.02[a]	0.15 ± 0.04[a]	-12.977	0.000
Medium vision				
Preoperative	0.45 ± 0.15	0.47 ± 0.15	-0.771	0.442
6 months after operation	0.24 ± 0.10[a]	0.36 ± 0.11[a]	-6.615	0.000
Near vision				
Preoperative	0.30 ± 0.07	0.31 ± 0.06	-0.884	0.378
6 months after operation	0.09 ± 0.02[a]	0.23 ± 0.05[a]	-21.617	0.000

[a]$P < 0.05$ when compared with preoperative.

Table 3 Comparison of objective visual quality between the two groups before and after operation

Index	Observation group (70 eyes)	Control group (64 eyes)	*t*	*P* value
OSI				
Preoperative	1.89 ± 0.33	1.92 ± 0.31	-0.541	0.589
6 months after operation	0.62 ± 0.21[a]	1.32 ± 0.26[a]	-17.209	0.000
MTF cut off (c/deg)				
Preoperative	8.28 ± 2.21	8.60 ± 2.03	-0.870	0.386
6 months after operation	22.32 ± 5.12[a]	14.44 ± 3.82[a]	10.022	0.000
100% OV				
Preoperative	0.26 ± 0.08	0.28 ± 0.09	-1.362	0.176
6 months after operation	0.88 ± 0.20[a]	0.54 ± 0.18[a]	10.308	0.000
20% OV				
Preoperative	0.28 ± 0.09	0.29 ± 0.07	-0.713	0.477
6 months after operation	0.78 ± 0.10[a]	0.40 ± 0.11[a]	20.947	0.000
9% OV				
Preoperative	0.09 ± 0.03	0.10 ± 0.03	-1.927	0.056
6 months after operation	0.36 ± 0.06[a]	0.18 ± 0.04[a]	20.235	0.000

[a]$P < 0.05$ when compared with preoperative. OSI: Objective scattering index; MTF: Modulation transfer function.

Comparison of the NEI-VFQ-25 scale scores between the two groups before and after surgery

The total score of the NEI-VFQ-25 scale and the scores of each item were higher in the observation group and the control group 6 months after surgery than before surgery ($P < 0.05$); the total score of NEI-VFQ-25 scale in the observation group at six months after surgery was significantly higher than in the control group ($P < 0.05$) Additionally, the scores of each item of NEI-VFQ-25 scale in the observation group at six months after surgery were significantly higher than those in the control group ($P < 0.05$) (Table 4).

Comparison of complication rates between the two groups

Two cases of postoperative IOP elevation and one case of accidental rupture of the capsule occurred in the observation group. In comparison, four cases of postoperative IOP elevation occurred in the control group. There was no statistical difference in the incidence of complications between the two groups ($c^2 = 0.010$, $P = 0.921 > 0.05$).

Table 4 Comparison of scores of 25-item National Eye Institute Visual Functioning Questionnaire before and after operation between the two groups

Index	Observation group (*n* = 57)	Control group (*n* = 53)	*t*	*P* value
General health				
Preoperative	1.92 ± 0.70	1.94 ± 0.65	-0.155	0.877
6 months after operation	2.80 ± 0.55[a]	2.33 ± 0.52[a]	4.597	0.000
Overall vision				
Preoperative	1.01 ± 0.22	1.02 ± 0.20	-0.249	0.804
6 months after operation	2.40 ± 0.20[a]	2.00 ± 0.19[a]	10.736	0.000
Eye pain				
Preoperative	4.23 ± 0.25	4.20 ± 0.30	0.571	0.569
6 months after operation	5.51 ± 0.32[a]	5.03 ± 0.29[a]	8.223	0.000
Near work				
Preoperative	3.82 ± 1.01	3.80 ± 1.02	0.103	0.918
6 months after operation	6.50 ± 1.03[a]	5.52 ± 1.00[a]	5.057	0.000
Far work				
Preoperative	2.65 ± 0.92	2.63 ± 0.91	0.115	0.909
6 months after operation	8.01 ± 0.95[a]	6.60 ± 0.92[a]	7.897	0.000
Social function				
Preoperative	3.90 ± 0.96	3.88 ± 0.92	0.111	0.912
6 months after operation	7.88 ± 0.92[a]	6.69 ± 0.96[a]	6.638	0.000
Mental health				
Preoperative	6.50 ± 1.00	6.43 ± 0.92	0.381	0.704
6 months after operation	11.32 ± 1.08[a]	9.82 ± 1.03[a]	7.442	0.000
Social role restriction				
Preoperative	2.71 ± 0.72	2.66 ± 0.67	0.376	0.707
6 months after operation	4.70 ± 0.82[a]	4.02 ± 0.90[a]	4.146	0.000
Independence				
Preoperative	3.83 ± 0.92	3.80 ± 0.94	0.169	0.866
6 months after operation	8.10 ± 0.65[a]	7.20 ± 0.72[a]	6.889	0.000
Drive				
Preoperative	2.11 ± 0.65	2.05 ± 0.61	0.498	0.619
6 months after operation	4.33 ± 1.00[a]	3.83 ± 0.82[a]	2.855	0.005
Color vision				
Preoperative	1.32 ± 0.43	1.29 ± 0.36	0.395	0.693
6 months after operation	2.56 ± 0.33[a]	2.10 ± 0.29[a]	7.742	0.000
Peripheral vision				
Preoperative	1.41 ± 0.43	1.38 ± 0.38	0.387	0.700
6 months after operation	2.66 ± 0.32[a]	2.15 ± 0.30[a]	8.607	0.000
Total score				
Preoperative	35.70 ± 6.55	35.29 ± 6.01	0.341	0.734
6 months after operation	66.89 ± 8.10[a]	57.60 ± 7.92[a]	6.075	0.000

[a]$P < 0.05$ when compared with preoperative.

DISCUSSION

Myopia and cataracts interact with each other, as shown by the long myopic eye axis, which leads to cataracts, lens degeneration, and hardening of the lens nucleus, resulting in refractive changes and myopia[16-18]. The symptoms of cataracts comorbid with myopia are more complicated, and the standard approach involves phacoemulsification combined with IOL implantation, which is often used to improve visual quality and reduce dependence on corrective glasses[19,20]. Studies have shown that[21,22] IOL implantation may lead to capsular bag collapse and increase α-smooth muscle actin expression if the lens epithelium remains in the anterior part of the capsule, leading to anterior capsule contraction. Furthermore, fibrosis of the lens epithelium behind the capsule may further affect the visual quality, underscoring the importance of capsule management[23-25].

In this study, patients with myopia accompanied by cataracts were included: the control group received conventional cataract phacoemulsification combined with IOL implantation treatment. In contrast, the observation group received refined capsular treatment based on the control group. At 6 months after surgery, the observation group's improvement in distance, middle, and near vision was more significant than in the control group. This indicates that capsule treatment is beneficial for visual acuity recovery. Continuous circumferential capsular tearing and polishing after phacoemulsification combined with IOL implantation may prevent asymmetric contraction of the capsular bag while removing the lens epithelium when treating the capsular membrane can effectively stabilise the IOL and enhance visual acuity recovery.

The OSI is a quantitative visual quality assessment, with higher values indicating greater intraocular scatter[26,27]. The MTF cut-off essentially denotes the spatial frequency at the maximum resolution of the human eye and is positively correlated with visual quality[28]. OV refers to image contrast at a specific spatial frequency[29]. These metrics allow quantitative evaluation of the visual quality of the patients. The results of this study showed that six months after surgery, the OSI of the observation group was significantly lower than that of the control group. At the same time, the MTF cut-off, 100% OV, 20% OV, and 9% OV were higher than those of the control group. This study suggests that the improvement in visual quality in the observation group was more significant than that in the control group, and treatment with the capsule membrane in the observation group during phacoemulsification and lens implantation significantly improved the visual quality of patients. The patient's capsular bag is prone to contraction and laxity of the suspensory ligament; these pathological changes are often asymmetrical and can cause IOL displacement. Viscoelastic injection in the capsule membrane prevents retinal detachment and stabilizes the capsular bag, reducing asymmetric contraction and movement and ultimately stabilizing the lens. After capsular membrane treatment, the IOL adhered well to the posterior capsular membrane, which further secured the stability of lens cell migration toward the visual axis region, thus improving visual quality in the observation group protocol[30].

The NEI-VFQ-25 questionnaire used in this study was modified and developed according to the characteristics of the domestic population to reflect changes in the vision-related quality of life in patients with eye disease[31,32]. The results of this study showed that the total score in the observation group was significantly higher than that in the control group six months after surgery, indicating improved vision-related quality of life. Focused capsular membrane management during phacoemulsification combined with lens implantation can improve difficulties and mental stress caused by visual impairment in patients. Fine treatment of the capsular membrane was implemented by fine polishing the anterior and posterior capsular membranes, improving the treatment results. The patients also showed a significant improvement in visual quality after surgery. Vision-related quality of life also improves when the visual quality improves.

Finally, the complication rate did not differ significantly between the groups, suggesting that capsular membrane treatment did not increase the risk of complications. Notably, Placing the ultrasonic emulsification needle at the center of the capsular bag during surgery minimized ultrasound energy usage, enhancing procedural safety.

In this study, vision-related quality of life indicators were also included to provide more comprehensive information in addition to assessing changes in visual acuity and complications. This was done to evaluate the efficacy of capsule treatment-assisted phacoemulsification combined with lens implantation for myopia with cataracts.

While, this study has some limitations, such as the limited sample size and follow-up period. And a larger and more extensive study could be the next step.

CONCLUSION

In conclusion, capsule treatment demonstrates clinical utility by restoring visual acuity and quality of life after myopia with cataract phacoemulsification combined with lens implantation.

FOOTNOTES

Author contributions: Liu W, Feng B and Wu WL designed this research; Liu W and Liu Q performed this research; Liu W and Zhou F analyzed the data; Liu W, Feng B and Wu WL wrote the manuscript.

Institutional review board statement: This study was approved by the institutional review board of Ganzhou Aier Ophthalmology Hospital.

Informed consent statement: The informed consent has been obtained form each participant.

Conflict-of-interest statement: All the authors report no relevant conflicts of interest for this article.

Data sharing statement: The data are available from the corresponding author.

CONSORT 2010 statement: The authors have read the CONSORT 2010 statement, and the manuscript was prepared and revised according to the CONSORT 2010 statement.

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S-Editor: Gong ZM
L-Editor: A
P-Editor: Zheng XM

REFERENCES

1 **Yang Y**, Chen H, An J, Fan W. Long-term effects of phacoemulsification and intraocular lens implantation in a patient with pathologic myopia and extremely long axial length: A case report. *Medicine (Baltimore)* 2020; **99**: e22081 [PMID: 32925746 DOI: 10.1097/MD.0000000000022081]
2 **Zhang C**, Dai G, Pazo EE, Xu L, Wu X, Zhang H, Lin T, He W. Accuracy of intraocular lens calculation formulas in cataract patients with steep corneal curvature. *PLoS One* 2020; **15**: e0241630 [PMID: 33216749 DOI: 10.1371/journal.pone.0241630]
3 **Bardoloi N**, Sarkar S, Burgute PS, Ghosh D, Deb AK. Capsular tension ring assisted phacoemulsification of morgagnian cataract. *Indian J Ophthalmol* 2021; **69**: 1781-1785 [PMID: 34146028 DOI: 10.4103/ijo.IJO_2723_20]
4 **Gao L**, Li M. Clinical efficacy of phacoemulsification combined intraocular lens implantation for treatment of high myopia with cataract: A protocol of systematic review. *Medicine (Baltimore)* 2020; **99**: e23215 [PMID: 33285698 DOI: 10.1097/MD.0000000000023215]
5 **Liu Q**, Wang X, Zhang S. Visual quality observation of clear lens extraction by ultrasonic phacoemulsification and intraocular lens implantation in a child with microspherophakia: A case report. *Medicine (Baltimore)* 2020; **99**: e21937 [PMID: 32846863 DOI: 10.1097/MD.0000000000021937]
6 **Bontu S**, Werner L, Kennedy S, Kamae K, Jiang B, Ellis N, Brady DG, Mamalis N. Long-term uveal and capsular biocompatibility of a new fluid-filled, modular accommodating intraocular lens. *J Cataract Refract Surg* 2021; **47**: 111-117 [PMID: 32815864 DOI: 10.1097/j.jcrs.0000000000000391]
7 **Patel SB**, Snyder ME, Riemann CD, Osher JM, Mi CW, Sisk RA. COMBINED PHACOEMULSIFICATION SURGERY WITH MULTIFOCAL INTRAOCULAR LENS IMPLANTATION AND PARS PLANA VITRECTOMY FOR SYMPTOMATIC VITREOUS OPACITIES. *Retin Cases Brief Rep* 2021; **15**: 724-729 [PMID: 30986810 DOI: 10.1097/ICB.0000000000000873]
8 **Mencucci R**, Cennamo M, Venturi D, Vignapiano R, Favuzza E. Visual outcome, optical quality, and patient satisfaction with a new monofocal IOL, enhanced for intermediate vision: preliminary results. *J Cataract Refract Surg* 2020; **46**: 378-387 [PMID: 32050218 DOI: 10.1097/j.jcrs.0000000000000061]
9 **Potemkin VV**, Astakhov SY, Goltsman EV, Van SY. Assessment of Risk Factors for the Development of Late Intraocular Lens Dislocation. *Oftal'mologiâ* 2021; **18**: 103-109 [DOI: 10.18008/1816-5095-2021-1-103-109]
10 **Shajari M**, Mackert MJ, Langer J, Kreutzer T, Wolf A, Kohnen T, Priglinger S, Mayer WJ. Safety and efficacy of a small-aperture capsular bag-fixated intraocular lens in eyes with severe corneal irregularities. *J Cataract Refract Surg* 2020; **46**: 188-192 [PMID: 32126030 DOI: 10.1097/j.jcrs.0000000000000045]
11 **Ozturk E**, Gunduz A. Optimal timing of capsular tension ring implantation in pseudoexfoliation syndrome. *Arq Bras Oftalmol* 2021; **84**: 158-162 [PMID: 33567013 DOI: 10.5935/0004-2749.20210024]
12 **Tataru CP**, Dogaroiu AC, Tataru CI, Dogaroiu C. Enhancing rotational stability of toric intraocular lenses using a type 2L Cionni capsular tension ring in patients with high myopia. *J Cataract Refract Surg* 2019; **45**: 1219-1221 [PMID: 31470939 DOI: 10.1016/j.jcrs.2019.05.045]
13 **Albayrak S**, Comba ÖB, Karakaya M. Visual performance and patient satisfaction following the implantation of a novel trifocal supplementary intraocular lens. *Eur J Ophthalmol* 2021; **31**: 2346-2352 [PMID: 33158370 DOI: 10.1177/1120672120969042]
14 **Liu Z**, Cao Q, Qu B, Wang W, Ruan X, Zheng D, Jin G, Tan X, Jin L, He M, Congdon N, Lin H, Luo L, Liu Y. Fluid-jet technique to polish the posterior capsule for phacoemulsification surgeries: efficacy and safety evaluation. *J Cataract Refract Surg* 2020; **46**: 1508-1514 [PMID: 32675653 DOI: 10.1097/j.jcrs.0000000000000319]
15 **Kalajas-tilga H**, Kaljurand K, Vahtrik D. The quality of life, neck and shoulder area dysfunction and upper body posture among people with and without moderate myopia. *BJHPA* 2021; **13**: 29-36 [DOI: 10.29359/BJHPA.13.1.04]
16 **Jiang HM**, Liang K, Tao LM. Comparative evaluation of rotational stability of toric IOLs with four-eyelet *vs* two-eyelet capsular tension rings in eyes with high myopia. *Int J Ophthalmol* 2021; **14**: 378-382 [PMID: 33747812 DOI: 10.18240/ijo.2021.03.07]

17 **Nath M**, Khodifad AM, Odayappan A, Christy JS, Manoharan S. Intraocular lens-sling technique: A safe approach for lens implantation in complicated cataract surgery and secondary intraocular lens implantation. *Indian J Ophthalmol* 2020; **68**: 632-635 [PMID: 32174584 DOI: 10.4103/ijo.IJO_1112_19]

18 **Ye Y**, Zhao J, Niu L, Shi W, Wang X, Zhou X. Long-term evaluation of anterior lens density after implantable collamer lens V4c implantation in patients with myopia over 40 years old. *Br J Ophthalmol* 2022; **106**: 1508-1513 [PMID: 34183326 DOI: 10.1136/bjophthalmol-2021-319205]

19 **Lin YH**, Wu CH, Huang SM, Hsieh C, Chen HS, Ku WC, Sun MH, Su WW. Early versus Delayed Phacoemulsification and Intraocular Lens Implantation for Acute Primary Angle-Closure. *J Ophthalmol* 2020; **2020**: 8319570 [PMID: 32351727 DOI: 10.1155/2020/8319570]

20 **He S**, Chen X, Wu X, Ma Y, Yu X, Xu W. Early-stage clinical outcomes and rotational stability of TECNIS toric intraocular lens implantation in cataract cases with long axial length. *BMC Ophthalmol* 2020; **20**: 204 [PMID: 32450828 DOI: 10.1186/s12886-020-01465-2]

21 **Dzhaber D**, Mustafa OM, Alsaleh F, Daoud YJ. Visual and refractive outcomes and complications in femtosecond laser-assisted versus conventional phacoemulsification cataract surgery: findings from a randomised, controlled clinical trial. *Br J Ophthalmol* 2020; **104**: 1596-1600 [PMID: 32066559 DOI: 10.1136/bjophthalmol-2019-314548]

22 **Wu Q**, Li Y, Tang L, Wu LA, Wang CY. Comparison of rigid versus foldable iris-fixed phakic intraocular lens implantation for high myopia: A systematic review and meta-analysis. *Medicine (Baltimore)* 2020; **99**: e19030 [PMID: 32028415 DOI: 10.1097/MD.0000000000019030]

23 **Sc A**, Is B, Mg C. Extra-Capsular Dissection (ECD) and the Extended-ECD: description of the technique and outcome of treatment. *ScienceDirect* 2021; **22**: e362

24 **Zeng M**, Wang R, Cheng B, Yang C, Chen Y, Liu X. Effectiveness of intraoperative intraocular lens use on improving surgical safety for dense cataract phacoemulsification: a randomized controlled trial. *Sci Rep* 2020; **10**: 1600 [PMID: 32005971 DOI: 10.1038/s41598-020-58597-0]

25 **Oli A**, Malik R, Waikar S. Differential optical density of fluid in capsular bag distension syndrome. *J Cataract Refract Surg* 2020; **46**: e20-e21 [PMID: 32818360 DOI: 10.1097/j.jcrs.0000000000000362]

26 **Yang S**, Jiang H, Nie K, Feng L, Fan W. Effect of capsular tension ring implantation on capsular stability after phacoemulsification in patients with weak zonules: a randomized controlled trial. CTR implantation in cataract patients with weak zonules. *BMC Ophthalmol* 2021; **21**: 19 [PMID: 33413210 DOI: 10.1186/s12886-020-01772-8]

27 **Țone S**, Niagu IA, Bogdănici ȘT, Bogdănici CM. Update in pediatric myopia treatment strategies. *Rom J Ophthalmol* 2020; **64**: 233-238 [PMID: 33367156]

28 **Łabuz G**, Yildirim TM, Khoramnia R, Son HS, Auffarth GU. Optical function of intraocular lenses in different opacification patterns: metrology analysis of 67 explants. *J Cataract Refract Surg* 2021; **47**: 1210-1217 [PMID: 33315739 DOI: 10.1097/j.jcrs.0000000000000553]

29 **Belov D**, Nikolaenko V, Potemkin V. Effect of capsular tension ring implantation during phacoemulsification on postoperative refraction. *Eur J Ophthalmol* 2022; **32**: 2189-2193 [PMID: 34693771 DOI: 10.1177/11206721211051920]

30 **Grisafe DJ 2nd**, Varma R, Burkemper BS, Xu BY, Torres M, Fairbrother-Crisp A, Patino CM, McKean-Cowdin R; African American Eye Disease Study Group. Impact of Visual Field Loss on Vision-Specific Quality of Life in African Americans: The African American Eye Disease Study. *Am J Ophthalmol* 2021; **229**: 52-62 [PMID: 33571475 DOI: 10.1016/j.ajo.2021.02.008]

31 **Schaal LF**, Meneghim RLSF, Rodrigues ACL, Padovani CR, Nunes HRC, Schellini SA. NEI VFQ-25 questionnaire is an excellent option to evaluate the quality of life of Brazilian patients with cataract? *Arq Bras Oftalmol* 2020; **83**: 447-448 [PMID: 33084822 DOI: 10.5935/0004-2749.20200103]

32 **Moon J**, Lee SM, Hyon JY, Kim MK, Oh JY, Choi HJ. Large diameter scleral lens benefits for Asians with intractable ocular surface diseases: a prospective, single-arm clinical trial. *Sci Rep* 2021; **11**: 2288 [PMID: 33504920 DOI: 10.1038/s41598-021-82010-z]

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