

World Journal of *Clinical Cases*

World J Clin Cases 2023 January 16; 11(2): 255-486



Contents

Thrice Monthly Volume 11 Number 2 January 16, 2023

REVIEW

- 255 Application of the cortical bone trajectory technique in posterior lumbar fixation
Peng SB, Yuan XC, Lu WZ, Yu KX
- 268 Allogeneic stem cell transplantation in the treatment of acute myeloid leukemia: An overview of obstacles and opportunities
Chen YF, Li J, Xu LL, Găman MA, Zou ZY
- 292 Idiopathic hirsutism: Is it really idiopathic or is it misnomer?
Unluhizarci K, Hacıoglu A, Taheri S, Karaca Z, Kelestimur F

MINIREVIEWS

- 299 Liver function in transgender persons: Challenges in the COVID-19 era
Milionis C, Ilias I, Koukkou E
- 308 Telenutrition for the management of inflammatory bowel disease: Benefits, limits, and future perspectives
Güney Coşkun M, Kolay E, Basaranoglu M
- 316 Liver transplantation amidst the COVID-19 era: Our center's experience
Khazaaleh S, Suarez ZK, Alomari M, Rashid MU, Handa A, Gonzalez AJ, Zervos XB, Kapila N
- 322 Prospects for the use of olfactory mucosa cells in bioprinting for the treatment of spinal cord injuries
Stepanova OV, Fursa GA, Andretsova SS, Shishkina VS, Voronova AD, Chadin AV, Karsuntseva EK, Reshetov IV, Chekhonin VP
- 332 Use of metaphors when treating unexplained medical symptoms
Seeman MV

ORIGINAL ARTICLE

Case Control Study

- 342 Microvesicles with mitochondrial content are increased in patients with sepsis and associated with inflammatory responses
Zhang HJ, Li JY, Wang C, Zhong GQ

Retrospective Study

- 357 Is fascial closure required for a 12-mm trocar? A comparative study on trocar site hernia with long-term follow up
Krittiyanitsakun S, Nampoolsuksan C, Tawantanakorn T, Suwatthanarak T, Srisuworanan N, Taweerutchana V, Parakonthon T, Phalanusitthepha C, Swangsri J, Akaraviputh T, Methasate A, Chinswangwatanakul V, Trakarnsanga A

- 366 Ten-year multicentric retrospective analysis regarding postoperative complications and impact of comorbidities in hemorrhoidal surgery with literature review

Moldovan C, Rusu E, Cochior D, Toba ME, Mocanu H, Adam R, Rimbu M, Ghenea A, Savulescu F, Godoroja D, Botea F

Observational Study

- 385 Tear inflammation related indexes after cataract surgery in elderly patients with type 2 diabetes mellitus

Lv J, Cao CJ, Li W, Li SL, Zheng J, Yang XL

CASE REPORT

- 394 Management of a rare giant cell tumor of the distal fibula: A case report

Fan QH, Long S, Wu XK, Fang Q

- 401 Repair of a giant inguinoscrotal hernia with herniation of the ileum and sigmoid colon: A case report

Liu SH, Yen CH, Tseng HP, Hu JM, Chang CH, Pu TW

- 408 Anti-leucine-rich glioma inactivated protein 1 encephalitis with sleep disturbance as the first symptom: A case report and review of literature

Kong DL

- 417 Fat-poor renal angiomyolipoma with prominent cystic degeneration: A case report and review of the literature

Lu SQ, Lv W, Liu YJ, Deng H

- 426 Perivascular epithelioid cell tumors of the liver misdiagnosed as hepatocellular carcinoma: Three case reports

Kou YQ, Yang YP, Ye WX, Yuan WN, Du SS, Nie B

- 434 H7N9 avian influenza with first manifestation of occipital neuralgia: A case report

Zhang J

- 441 Gefitinib improves severe bronchorrhea and prolongs the survival of a patient with lung invasive mucinous adenocarcinoma: A case report

Ou GC, Luo W, Zhang WS, Wang SH, Zhao J, Zhao HM, Qiu R

- 449 Habitual khat chewing and oral melanoacanthoma: A case report

Albagieh H, Aloyouny A, Alshagroud R, Alwakeel A, Alkait S, Almufarji F, Almutairi G, Alkhalaf R

- 456 Systemic lupus erythematosus with multicentric reticulohistiocytosis: A case report

Liu PP, Shuai ZW, Lian L, Wang K

- 464 X-linked Charcot-Marie-Tooth disease after SARS-CoV-2 vaccination mimicked stroke-like episodes: A case report

Zhang Q, Wang Y, Bai RT, Lian BR, Zhang Y, Cao LM

- 472 Acute liver injury in a COVID-19 infected woman with mild symptoms: A case report

Lai PH, Ding DC

LETTER TO THE EDITOR

- 479** Incidence and clinical treatment of hypertriglyceridemic acute pancreatitis: A few issues

Yang QY, Zhao Q, Hu JW

- 482** Management of infected acute necrotizing pancreatitis

Pavlidis ET, Pavlidis TE

ABOUT COVER

Editorial Board Member of *World Journal of Clinical Cases*, Manish Ramesh Balwani, DNB, FASN, MBBS, MD, Professor, Department of Nephrology, Saraswati Kidney Care Center, Nagpur 442301, Maharashtra, India. balwani.manish@yahoo.com

AIMS AND SCOPE

The primary aim of *World Journal of Clinical Cases* (WJCC, *World J Clin Cases*) is to provide scholars and readers from various fields of clinical medicine with a platform to publish high-quality clinical research articles and communicate their research findings online.

WJCC mainly publishes articles reporting research results and findings obtained in the field of clinical medicine and covering a wide range of topics, including case control studies, retrospective cohort studies, retrospective studies, clinical trials studies, observational studies, prospective studies, randomized controlled trials, randomized clinical trials, systematic reviews, meta-analysis, and case reports.

INDEXING/ABSTRACTING

The WJCC is now abstracted and indexed in Science Citation Index Expanded (SCIE, also known as SciSearch®), Journal Citation Reports/Science Edition, Current Contents®/Clinical Medicine, PubMed, PubMed Central, Scopus, Reference Citation Analysis, China National Knowledge Infrastructure, China Science and Technology Journal Database, and Superstar Journals Database. The 2022 Edition of Journal Citation Reports® cites the 2021 impact factor (IF) for WJCC as 1.534; IF without journal self cites: 1.491; 5-year IF: 1.599; Journal Citation Indicator: 0.28; Ranking: 135 among 172 journals in medicine, general and internal; and Quartile category: Q4. The WJCC's CiteScore for 2021 is 1.2 and Scopus CiteScore rank 2021: General Medicine is 443/826.

RESPONSIBLE EDITORS FOR THIS ISSUE

Production Editor: *Hua-Ge Yin*; Production Department Director: *Xu Guo*; Editorial Office Director: *Jin-Lei Wang*.

NAME OF JOURNAL

World Journal of Clinical Cases

ISSN

ISSN 2307-8960 (online)

LAUNCH DATE

April 16, 2013

FREQUENCY

Thrice Monthly

EDITORS-IN-CHIEF

Bao-Gan Peng, Jerzy Tadeusz Chudek, George Kontogeorgos, Maurizio Serati, Ja Hyeon Ku

EDITORIAL BOARD MEMBERS

<https://www.wjgnet.com/2307-8960/editorialboard.htm>

PUBLICATION DATE

January 16, 2023

COPYRIGHT

© 2023 Baishideng Publishing Group Inc

INSTRUCTIONS TO AUTHORS

<https://www.wjgnet.com/bpg/gerinfo/204>

GUIDELINES FOR ETHICS DOCUMENTS

<https://www.wjgnet.com/bpg/GerInfo/287>

GUIDELINES FOR NON-NATIVE SPEAKERS OF ENGLISH

<https://www.wjgnet.com/bpg/gerinfo/240>

PUBLICATION ETHICS

<https://www.wjgnet.com/bpg/GerInfo/288>

PUBLICATION MISCONDUCT

<https://www.wjgnet.com/bpg/gerinfo/208>

ARTICLE PROCESSING CHARGE

<https://www.wjgnet.com/bpg/gerinfo/242>

STEPS FOR SUBMITTING MANUSCRIPTS

<https://www.wjgnet.com/bpg/GerInfo/239>

ONLINE SUBMISSION

<https://www.f6publishing.com>



Observational Study

Tear inflammation related indexes after cataract surgery in elderly patients with type 2 diabetes mellitus

Jun Lv, Cheng-Jian Cao, Wei Li, Shuang-Le Li, Jun Zheng, Xiu-Li Yang

Specialty type: Ophthalmology

Provenance and peer review:

Unsolicited article; Externally peer reviewed.

Peer-review model: Single blind

Peer-review report's scientific quality classification

Grade A (Excellent): 0
Grade B (Very good): B
Grade C (Good): C
Grade D (Fair): 0
Grade E (Poor): 0

P-Reviewer: Karalliedde J, United Kingdom; Meyhofer S, Germany

Received: November 15, 2022

Peer-review started: November 15, 2022

First decision: November 30, 2022

Revised: December 15, 2022

Accepted: December 21, 2022

Article in press: December 21, 2022

Published online: January 16, 2023



Jun Lv, Jun Zheng, Department of Optometry, North Sichuan Medical College, Nanchong 637000, Sichuan Province, China

Cheng-Jian Cao, Zigong Academy of Medical Sciences, Zigong First People's Hospital, Zigong 643000, Sichuan Province, China

Wei Li, FB Biologie, Philipps-Universität Marburg, Marburg 35043, Germany

Shuang-Le Li, Xiu-Li Yang, Department of Ophthalmology, Zigong First People's Hospital, Zigong 643000, Sichuan Province, China

Corresponding author: Shuang-Le Li, MM, Chief Physician, Department of Ophthalmology, Zigong First People's Hospital, No. 42 The 1st Branch Road of Shangyihao, Ziliujin District, Zigong 643000, Sichuan Province, China. lishuangle06@163.com

Abstract

BACKGROUND

Quantitative studies on the changes in inflammation-related content in tears, especially the effect of diabetes, are lacking. In this study, we measured the preoperative and postoperative tear inflammatory mediator levels in cataract patients, focusing on the expression of inflammatory factors in postoperative cataracts in the diabetic, and investigated the effect of drugs on the control of postoperative inflammation.

AIM

To study the expression of inflammatory factors in elderly people with type 2 diabetes after cataract surgery.

METHODS

Patients with a mean age of 70.3 ± 6.3 years were divided into group A (composed of elderly patients with cataracts and type 2 diabetes, $n = 20$ eyes) and group B (patients with age-related cataract, $n = 20$ eyes). Their tears were collected before each operation and on days 1 and 3, and weeks 1, 2, 3, and 4 post-surgery. Saline (150 μ L) was dropped into the conjunctival sac of the surgical eye, followed by oculogyrations in four directions. The fluid in the conjunctival sac was extracted using a sterile syringe and stored in Eppendorf tubes at -80°C until measurement. The expression levels of matrix metalloproteinase-2 (MMP-2), MMP-9, tissue inhibitor of metalloproteinase-1 (TIMP-1), TIMP-2, interleukin-6 (IL-6), and IL-20

in tear fluid were measured using enzyme-linked immunosorbent assays.

RESULTS

The postoperative expression levels of MMP-2, MMP-9, TIMP-2, IL-6, and IL-20 in group A were significantly higher than those in group B, whereas the concentration of TIMP-1 in group A remained lower than that in group B. The levels of MMP-2 and IL-6 in both groups continuously increased until the peak in the first postoperative week, and then gradually decreased over the next three weeks. Ultimately, MMP-2 declined to a lower level than that preoperatively at week 4, but IL-6 decreased to the same level as that preoperatively. The level of MMP-9 peaked in the first two weeks postoperative and then returned to the same level as 1-day post-operation. The concentration of TIMP-1 post-operation remained constant at a lower level than before surgery, and TIMP-2 Levels remained stable in both groups. IL-20 content started to increase in the third week after surgery.

CONCLUSION

Inflammatory factor levels in tears fluctuated before and post-operation, which indicated more severe postoperative inflammation in the first two weeks.

Key Words: Type 2 diabetes mellitus; Elderly patients; Cataract surgery; Tear inflammation-related indicators; Temporal changes; Prognosis

©The Author(s) 2023. Published by Baishideng Publishing Group Inc. All rights reserved.

Core Tip: In this study, we compared the expression of inflammatory factors in postoperative tears of cataract patients and found that postoperative inflammation was more severe in elderly patients with cataract combined with type 2 diabetes; moreover, the level of postoperative inflammatory factors fluctuated greatly, and the inflammation was more severe in the first two weeks after surgery.

Citation: Lv J, Cao CJ, Li W, Li SL, Zheng J, Yang XL. Tear inflammation related indexes after cataract surgery in elderly patients with type 2 diabetes mellitus. *World J Clin Cases* 2023; 11(2): 385-393

URL: <https://www.wjgnet.com/2307-8960/full/v11/i2/385.htm>

DOI: <https://dx.doi.org/10.12998/wjcc.v11.i2.385>

INTRODUCTION

Cataracts are the main cause of blindness and affect millions of people worldwide[1]. Diabetes is one of the most prevalent chronic diseases in the world. Patients with type 2 diabetes have a higher risk of cataracts than those without diabetes and require surgery more urgently[2]. Cataract patients with diabetes are also at a higher risk of delayed incisional healing and postoperative complications, such as dry eye, corneal epithelial defects or erosions, persistent inflammatory reactions, and infections[3]. Currently, China is rapidly becoming an aging society, with an increasing proportion of the aged population. Changes in tear composition in elderly patients resulting from loss of the meibomian gland gradually aggravate with age. Additionally, abnormal diabetes-induced variations in tear components might cause postoperative inflammatory reactions in patients with type 2 diabetes[4]. Xerophthalmia was observed significantly more frequently in diabetic patients than in non-diabetics 7 d after phacoemulsification[5]. Another retrospective clinical study confirmed that the risk of complications in patients with diabetes was highest in the first 2 wk after cataract surgery[6].

The development of postoperative inflammation may be significantly affected by these inflammation-related mediators, but quantitative studies on inflammatory-related content changes in tears, particularly the effect of diabetes mellitus, are still lacking. This study focused on the postoperative expression of inflammatory factors in elderly diabetic cataracts to discuss the effects of drugs on the control of postoperative inflammation.

MATERIALS AND METHODS

Patients

Patients diagnosed with age-related cataracts and treated with cataract surgery in our hospital between December 2021 and January 2022 were divided into group A (cataract with combined type 2 diabetes

mellitus, $n = 20$ eyes) and Group B (elderly patients with cataracts but no diabetes, $n = 20$ eyes).

The inclusion criteria were as follows: patients with cataract with or without a confirmed history of type 2 diabetes mellitus, eligibility for geriatric cataract surgery, clear state of consciousness, and ability to cooperate with relevant examinations.

Exclusion criteria: Patients with previous/current ocular/systemic inflammation, fever, immunological diseases, history of ocular surgery or trauma, intraoperative complications, or inability to cooperate with examinations.

General clinical parameters, such as age, sex, body temperature, height, and weight, and detailed medical history were acquired, measured, and recorded. Hemanalysis and measurement of indicators were performed for all patients, including blood glucose, triglycerides (TG), total cholesterol (TC), glycated hemoglobin (HbA1c), glycated albumin (GA), tear matrix metalloproteinase-2 (MMP-2), MMP-9, tissue inhibitor of metalloproteinase-1 (TIMP-1), TIMP-2, interleukin-6 (IL-6), and IL-20. All patients underwent ophthalmic observations and examinations, including visual acuity (before and postoperative, categorized as ≤ 0.3 , $0.3-0.6$, and ≥ 0.6), intraocular pressure, slit lamp examination, fundus state, cataract-related preoperative examinations, ocular-surface states, healing and inflammatory states of corneal incision.

Tears collection and measurement

Tears were collected before surgery and on days 1 and 3 and weeks 1, 2, 3, and 4 post-operation. Saline (150 μ L) was dropped into the conjunctival sac of the surgical eye, followed by oculogyrator in four directions. The fluid in the conjunctival sac was extracted using a sterile syringe and stored in Eppendorf tubes at -80°C until measurement. The concentrations of MMP-2, MMP-9, TIMP-1, TIMP-2, IL-6, and IL-20 in the tear fluid were measured using enzyme-linked immunosorbent assay.

Surgical procedure

All patients were administered pranoprofen eye drops 3 times/d and levofloxacin eye drops 3 times/d, three days before surgery. All procedures were performed by the same surgeon. Mydriasis was induced with compound tropicamide 30 min before surgery and surface anesthesia with oxybuprocaine hydrochloride drops before surgery. A main incision was made on the temporal side of the transparent cornea, and a secondary incision was made on the inferior temporal (left eye) or superior temporal (right eye) side of the transparent cornea. Continuous circular capsulorhexis was performed through the injection of viscoelastic agents, the nucleus was emulsified after hydro-dissection and hydro-delineation, followed by aspiration of the cortex, and the intraocular lens was implanted into the polished capsular bag. Surgery was completed after irrigation of the anterior chamber, aspiration of viscoelastic agents, and closure of the conjunctiva with solution. After surgery, all patients were administered tobramycin and dexamethasone eye drops three times/d for one month, pranoprofen eye drops three times/d for two weeks, and levofloxacin eye drops three times/d for two weeks.

Statistical analysis

Differences in inflammatory factor expression (indicated as mean and standard deviation) between diabetic and non-diabetic elderly patients with cataract were determined by performing repeated-measures and Analysis of Variance using SPSS 26.0. Differences in age, intraocular pressure (IOP), HbA1c, GA, TG, and TC between the two groups were verified using Student's test in SPSS 26.0. Differences in sex between the two groups were determined using the χ^2 test. Statistical significance was set at $P < 0.05$.

RESULTS

Comparison of general information

A comparison was performed with 19 eyes of 19 males (47.5%) and 21 eyes of 21 females (52.5%), whose mean age was (70.3 ± 6.3) years, and the mean disease course duration of diabetes in group A was (6.8 ± 2.2) years. Patients were further grouped based on their preoperative visual acuity as ≤ 0.1 , $0.1-0.3$, and ≥ 0.3 . The composition of sex and age, visual acuity, IOP, TG, and TC between the groups was not significantly different, while significant differences were detected in HbA1c and GA (Table 1).

Changes in the expression levels of MMP-2 and MMP-9 in tear fluid at each time point in the two groups

The level of MMP-2 in both groups continuously increased until it peaked in the first week postoperatively and then gradually decreased over the next three weeks, ultimately declining to a level lower than the preoperative level at week 4. The level of MMP-9 peaked in the first two weeks postoperative and then returned to the same level as 1-day post-operation. The expression levels of MMP-2 and MMP-9 in group A were significantly higher than those in group B at all time points (Table 2, Figure 1A and B; $P < 0.001$).

Table 1 Comparison of general information between two groups of patients

Groups	Age ¹ (yr)	Gender ² (M/F)	Visual acuity (BCVA) ³			Intraocular pressure ¹ (mmHg)	HbA1c ¹ (%)	GA ¹ (%)	TG ¹ (mmol/L)	TC ¹ (mmol/L)
			≤ 0.1	0.1-0.3	≥ 0.3					
Group A	69.3 ± 6.6	9/11	9	8	3	15.3 ± 2.28	8.2 ± 0.6	25.1 ± 4.8	2.0 ± 0.3	5.7 ± 0.4
Group B	71.0 ± 5.0	10/10	8	10	2	15.8 ± 2.76	5.4 ± 0.1	14.0 ± 1.5	1.7 ± 0.3	5.6 ± 0.4
χ^2/F value	1.196	0.100		0.481		0.225	8.197	8.700	0.238	0.749
P value	0.557	0.752		0.829		0.575	0.002	0.020	0.458	0.142

¹The use of two independent samples *t*-test.²The use of the χ^2 test.³The use of Pearson's χ^2 test.

HbA1c: glycated hemoglobin; GA: glycated albumin; TG: triglycerides; TC: total cholesterol.

Table 2 Comparison of matrix metalloproteinase-2 and matrix metalloproteinase-9 levels in the tears of two groups at different time points

Time	MMP-2 (ng/mL)				MMP-9 (ng/mL)			
	Group A	Group B	t value	P value	Group A	Group B	t value	P value
Preoperative	11.13 ± 0.56	8.83 ± 0.88	11.65	0.000	36.07 ± 1.82	25.55 ± 1.74	13.22	0.000
1 d	10.71 ± 0.68	8.07 ± 0.68	10.54	0.000	42.90 ± 1.82	32.69 ± 2.33	10.96	0.000
3 d	13.53 ± 0.79	10.42 ± 0.96	11.06	0.000	43.37 ± 1.33	32.80 ± 1.02	18.09	0.000
1 wk	14.45 ± 0.9	10.54 ± 0.94	8.22	0.000	56.25 ± 1.96	43.02 ± 1.45	20.45	0.000
2 wk	13.17 ± 0.93	9.43 ± 0.49	12.29	0.000	72.78 ± 1.66	51.99 ± 1.71	41.48	0.000
3 wk	11.37 ± 0.40	9.15 ± 0.60	9.99	0.000	43.81 ± 2.68	32.55 ± 1.3	14.70	0.000
4 wk	8.77 ± 0.83	7.62 ± 0.84	2.63	0.017	44.41 ± 3.15	31.97 ± 1.58	13.79	0.000

MMP: Matrix metalloproteinase.

Changes in the expression levels of TIMP-1 and TIMP-2 in tear fluid at each time point in the two groups

After a decline in the first two postoperative weeks and an increase from the third week, the concentration of TIMP-1 in group A was still lower than that before surgery at four weeks post-operation. The expression level of TIMP-1 in group A was lower than that in group B (Figure 1C, $P < 0.05$). The level of tear TIMP-2 in group A was higher than that in group B before and after operation (Table 3, Figure 1D; $P < 0.01$).

Changes in IL-6 and IL-20 expression levels in tear fluid at each time point in both groups

After surgery, IL-6 Levels in both groups increased in the first week, but remained at a higher level in group A than in group B (Figure 1E, $P < 0.001$). Similar trends in IL-20 Levels were observed in the two groups, which were also higher in group A than in group B ($P < 0.05$). Its concentration remained constant before the third week after operation, surged to a peak in the third week post-operation, and then started to slump in the fourth week (Table 4, Figure 1F).

DISCUSSION

Hyperglycemia contributes to impaired corneal sensitivity, reduces nerve fiber density, and delays epithelial wound healing. Due to reduced corneal sensitivity, reflex-induced tear secretion decreases together with the blink rate in diabetic patients, which ultimately leads to increased tear evaporation[7]. Corneal incision accompanied by nerve amputation and microscopic light illumination in cataract

Table 3 Comparison of tissue inhibitor of metalloproteinase-1 and tissue inhibitor of metalloproteinase-2 levels in the tears of two groups of patients at different time points

Time	TIMP-1 (ng/mL)				TIMP-2 (ng/mL)			
	Group A	Group B	t value	P value	Group A	Group B	t value	P value
Preoperative	5.24 ± 0.13	5.77 ± 0.10	2.34	0.032	4.28 ± 0.15	3.33 ± 0.28	6.13	0.004
1 d	5.25 ± 0.15	5.76 ± 0.12	2.06	0.028	4.22 ± 0.18	3.58 ± 0.34	6.01	0.003
3 d	5.23 ± 0.14	4.89 ± 0.11	2.83	0.027	4.19 ± 0.13	3.71 ± 0.2	5.41	0.007
1 wk	4.57 ± 0.15	4.61 ± 0.23	0.45	0.060	4.28 ± 0.13	3.44 ± 0.36	5.08	0.006
2 wk	4.20 ± 0.13	5.51 ± 0.15	2.75	0.021	4.23 ± 0.18	3.51 ± 0.31	6.51	0.002
3 wk	4.71 ± 0.18	5.50 ± 0.14	5.75	0.005	4.29 ± 0.16	3.50 ± 0.35	6.60	0.004
4 wk	4.70 ± 0.17	5.77 ± 0.13	7.34	0.003	4.19 ± 0.16	3.50 ± 0.37	6.64	0.003

TIMP: Tissue inhibitor of metalloproteinase.

Table 4 Comparison of interleukin-6 and interleukin-20 levels in the tears of two groups of patients at different time points

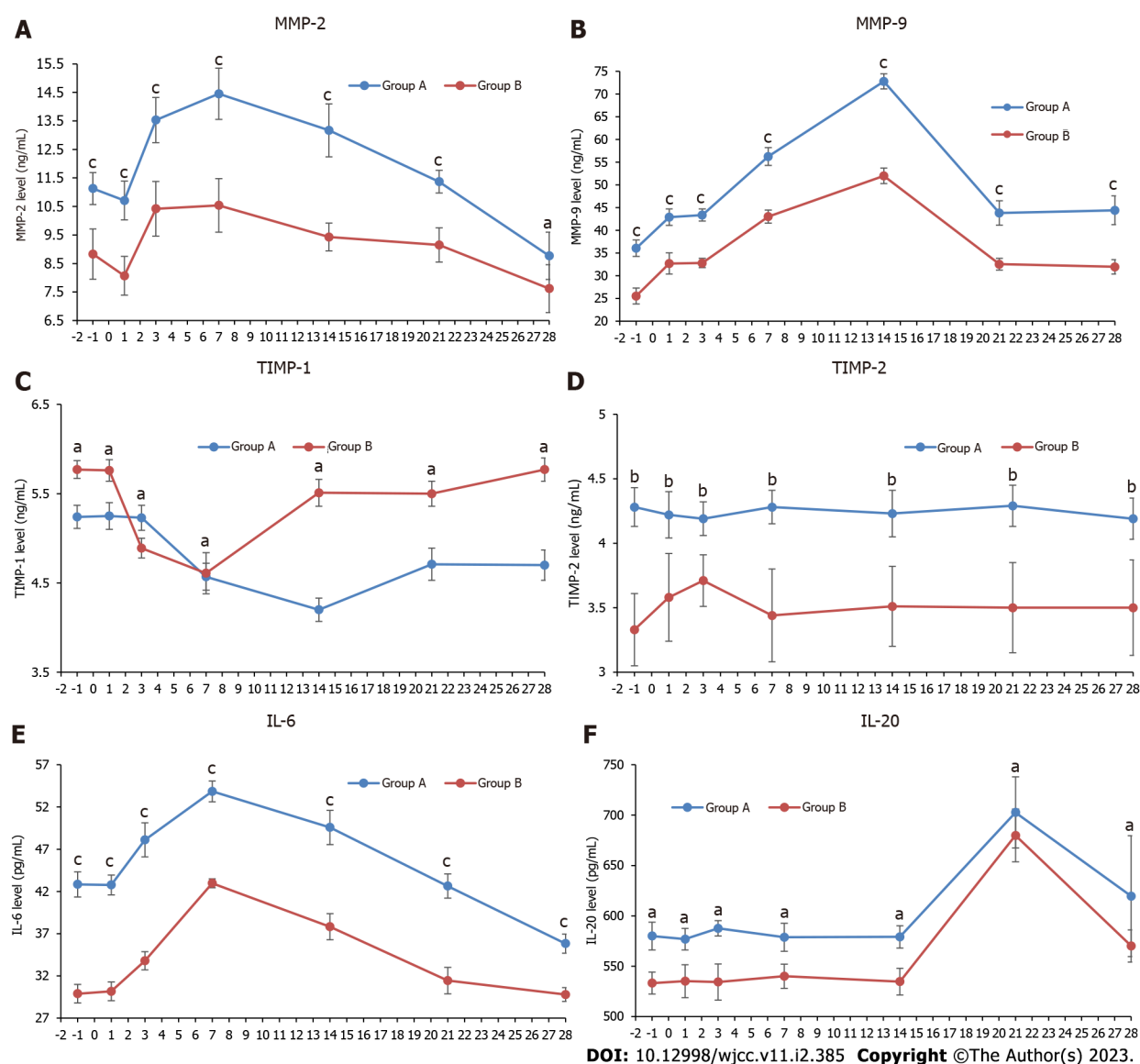
Time	IL-6 (pg/mL)				IL-20 (pg/mL)			
	Group A	Group B	t value	P value	Group A	Group B	t value	P value
Preoperative	42.84 ± 1.49	29.89 ± 1.09	22.33	0.000	579.90 ± 13.89	533.15 ± 10.9	2.78	0.021
1 d	42.77 ± 1.18	30.17 ± 1.11	24.65	0.000	576.82 ± 10.67	535.13 ± 16.38	2.39	0.024
3 d	48.11 ± 2.01	33.79 ± 1.08	19.90	0.000	587.52 ± 7.62	534.28 ± 17.92	2.91	0.037
1 wk	53.85 ± 1.24	42.97 ± 0.52	25.76	0.000	578.75 ± 13.9	539.97 ± 11.95	2.50	0.038
2 wk	49.58 ± 2.02	37.82 ± 1.55	14.63	0.000	579.08 ± 11.15	534.64 ± 13.27	2.67	0.035
3 wk	42.64 ± 1.43	31.44 ± 1.57	16.73	0.000	702.67 ± 35.3	679.85 ± 26.2	2.62	0.032
4 wk	35.82 ± 1.14	29.79 ± 0.81	13.70	0.000	619.55 ± 60.04	570.05 ± 15.94	2.43	0.036

IL: Interleukin.

surgeries, use of anesthetics, mydriatic drops, and postoperative antibiotics and hormones increases the risk of postoperative complications in diabetic patients. In summary, patients with type-2-diabetes with cataracts are at a higher risk of postoperative complications and have more difficulty in epithelial wound healing than cataracts in patients with normal blood glucose levels, which suggests that more attention should be paid to their treatment.

MMPs are a highly conserved family of proteinases that can degrade various extracellular matrix components[8]. The expression levels of MMPs are extremely low under normal physiological conditions and can be significantly upregulated by inflammatory factors, growth factors, and pathological conditions such as high glucose and oxidative stress. TIMPs are active in many tissues and body fluids as endogenous inhibitors of MMPs[9]. It was confirmed both *in vitro* and *in vivo* that upregulated expression levels of MMP-2 and MMP-9 in wound healing of high glucose cultured corneal epithelial cells and corneal epithelial cells from diabetic rats can lead to xerophthalmia, defects, and erosions of corneal epithelial and ocular inflammation[10]. Increased MMP-9 expression in ocular tissues has also been observed in recurrent corneal erosion, skin ulcers, and diabetic retinopathy[11]. Tears containing levels of MMP-2, MMP-9, and TIMP-2 before and post-operation, were estimated to be higher in patients with diabetes than in elderly patients with cataracts but no diabetes. It is thought to be a response to the stimulation of the ocular surface by long-term high blood glucose concentrations and chronic inflammation. In addition, the gradual increase in MMP-2/9 Levels in the first two postoperative weeks suggested that severe inflammatory responses occurred in the first two weeks post cataract surgery. TIMP-1 expression was suppressed after surgery in both groups and was more significant in group A. This suppression works in concert with the upregulated expression of MMPs and ultimately causes severe inflammation in patients with diabetes.

IL-6 is a pleiotropic cytokine that affects various cell types, including pro-inflammatory and anti-inflammatory cytokines[12]. Dysregulation of IL-6 signaling is associated with the pathogenesis of several autoimmune and inflammatory diseases, including type 2 diabetes[13]. The causality between



DOI: 10.12998/wjcc.v11.i2.385 Copyright ©The Author(s) 2023.

Figure 1 Changes of some indicators' levels in tears before and after surgery in both groups. A: Matrix metalloproteinase-2 (MMP-2); B: MMP-9; C: Tissue inhibitor of metalloproteinase-1 (TIMP-1); D: TIMP-2; E: Interleukin-6 (IL-6); F: IL-20. ^a*P* < 0.05, ^b*P* < 0.01, ^c*P* < 0.001. MMP: Matrix metalloproteinase; TIMP: Tissue inhibitor of metalloproteinase; IL: Interleukin.

chronic low-grade inflammation, indicated by elevated circulating levels of inflammatory cytokines (e.g., IL-6), and the pathogenesis of type 2 diabetes has been progressively verified[14]. Previous studies have shown that during trauma, many inflammatory cells accumulate and release early inflammatory mediators, mainly tumor necrosis factors- α and IL-6, which initiate a systemic inflammatory response and promote the expression of MMP-2, the overexpression of which is responsible for the disease. In corneal keratopathy, IL-6-mediated MMP-2 expression results in continuous tissue necrosis followed by degradation[15].

The interaction between IL-20 and its receptor may have pro-inflammatory, angiogenic, and chemo-attractive effects in chronic inflammatory diseases, especially atherosclerosis and rheumatoid arthritis. This may also have a certain degree of impact on type 2 diabetes. We also detected the expression of IL-20 and related receptors in corneal epithelial cells, dendritic cells, and monocytes of wild-type mice. By promoting the aggregation and activation of T-cells in the injured cornea, IL-20 exerts anti-inflammatory effects without increasing neutrophil chemotaxis or promoting corneal epithelialization and wound healing[16]. This process of corneal re-epithelialization can be inhibited by the absence of neutrophils or T cells. In this study, IL-6 Levels gradually increased to a peak on days 1 and 3; and on week 1 post-operation, and then gradually decreased at weeks 2, 3, and 4 post-operation. This might be related to the gradual aggravation of early inflammation, which could induce the expression of IL-6 to further promote anti-inflammatory effects after cataract surgery. The increase in IL-20 in the third week after cataract surgery might be caused by the decreased release of inflammatory factors in the third week after cataract surgery, which could promote IL-20 expression and further contribute to corneal wound healing.

In this study, as there was a trend of correlated changes in postoperative inflammatory factor expression when the same ophthalmic medication was applied pre and postoperatively to the eyes of both groups, it was speculated that the application of anti-inflammatory and infection-preventive ophthalmic drugs before and after surgery had an effect on postoperative healing. Meanwhile, both the pre and postoperative levels of relevant inflammatory factors were higher in the test group than in the control group, indicating that the postoperative inflammatory response was higher in the test group based on the application of the same dosages of ophthalmic drugs. Therefore, it was considered clinically that within one week after cataract surgery, the frequency and duration of relevant ophthalmic drugs could be increased to reduce the postoperative inflammatory response in patients with combined diabetes and cataracts. Another study found that the use of ultrasound emulsification combined with IOL implantation based on routine glycemic control, IOP control, and anti-inflammation in patients with cataracts combined with diabetes, reduced the levels of inflammatory factors in the atrial fluid and oxidative stress indicators in such patients[17].

Our study has several limitations. First, it was a small sample; second, there was a lack of information about the patients' blood glucose levels and the duration of their disease, and some patients may have been undiagnosed or were untreated for diabetes before surgery; third, the number of preoperative tears and tear volume in patients was inadequate.

CONCLUSION

Comparison between inflammatory indices at different time points before and after surgery revealed more severe postoperative inflammation in patients with Type 2 diabetes with cataracts than in elderly patients with cataracts but without diabetes. Postoperative levels of inflammatory factors in tears were fluid, particularly compared to levels before the operation. The expression of most inflammatory factors peaked in the first two weeks after surgery, when patients were considered most vulnerable to inflammatory complications. Therefore, the increased use of anti-inflammatory drugs in the first two postoperative weeks was proposed based on our observations.

ARTICLE HIGHLIGHTS

Research background

Quantitative studies on the changes in inflammation-related content in tears, especially the effect of diabetes, are lacking. In this study, we measured the preoperative and postoperative tear inflammatory mediator levels in cataract patients, focusing on the expression of inflammatory factors in postoperative diabetic cataracts in the elderly, and investigated the effect of drugs on the control of postoperative inflammation.

Research motivation

Postoperative inflammation is more severe in diabetic patients with cataracts than in elderly cataract patients who are not diabetic, and the level of inflammatory factors in the postoperative tears is also higher in the former. Therefore, this strengthened the recommendation for the use of anti-inflammatory drugs in the first two postoperative weeks, that was proposed based on our observations.

Research objectives

This study studies the expression of inflammatory factors in elderly people with type 2 diabetes after cataract surgery. This may provide a basis for the timing and duration of anti-inflammatory medication use in patients undergoing cataract surgery.

Research methods

This study was an observational study. The patients were divided into two groups. Group A (patients with cataracts with combined type 2 diabetes) and group B (patients with cataracts without combined type 2 diabetes). Their tears were collected before each operation and on days 1 and 3 and weeks 1, 2, 3, and 4 post-surgery, and an enzyme-linked immunosorbent assay was used to detect the level of inflammatory mediators in tear fluid.

Research results

The expression levels of matrix metalloproteinase-2 (MMP-2), MMP-9, tissue inhibitor of metalloproteinase-2 (TIMP-2), interleukin-6 (IL-6), and IL-20 in group A were significantly higher than those in group B after surgery, whereas the expression level of TIMP-1 in group A was always lower than that in group B.

Research conclusions

Postoperative tear inflammation is more severe in cataract patients with diabetes than in elderly patients. Inflammatory factor levels in tears fluctuated before and post-operation, which indicated more severe postoperative inflammation in the first two weeks.

Research perspectives

Future studies should expand the sample size, standardize inclusion criteria for cataract patients with or without type 2 diabetes, measure their blood glucose levels before surgery, and investigate other disease characteristics to reduce confounding factors and increase the number of preoperative tear collections and tear volumes for patients.

FOOTNOTES

Author contributions: Li SL was the guarantor and proposed the research topics; Lv J designed the research protocols and wrote the manuscript; Cao CJ and Zheng J participated in the analysis and interpretation of the data; Li W revised the major elements of the manuscript; Yang XL participated in data collection; all authors reviewed and approved the final version to be published.

Supported by Cataract Prevention and Control Appropriate Technology Base of Sichuan Provincial Health Commission (Regional Demonstration), No. 2022JDXM012.

Institutional review board statement: The study was reviewed and approved by Zigong First Peoples Hospital.

Informed consent statement: All study participants or their legal guardians provided written informed consent prior to study enrollment.

Conflict-of-interest statement: There are no conflicts of interest to declare.

Data sharing statement: No additional data are available.

STROBE statement: The authors have read the STROBE statement checklist of items, and the manuscript was prepared and revised according to the STROBE statement checklist of items.

Open-Access: This article is an open-access article that was selected by an in-house editor and fully peer-reviewed by external reviewers. It is distributed in accordance with the Creative Commons Attribution NonCommercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <https://creativecommons.org/licenses/by-nc/4.0/>

Country/Territory of origin: China

ORCID number: Jun Lv 0000-0002-8599-511X; Cheng-Jian Cao 0000-0001-8452-3826; Wei Li 0000-0003-3161-7903; Shuang-Le Li 0000-0001-9821-8953; Jun Zheng 0000-0002-8874-2468; Xiu-Li Yang 0000-0002-7967-458X.

S-Editor: Wang JL

L-Editor: A

P-Editor: Wang JL

REFERENCES

- Lee CM, Afshari NA. The global state of cataract blindness. *Curr Opin Ophthalmol* 2017; **28**: 98-103 [PMID: 27820750 DOI: 10.1097/ICU.0000000000000340]
- Grzybowski A, Kancierz P, Huerva V, Ascaso FJ, Tuuminen R. Diabetes and Phacoemulsification Cataract Surgery: Difficulties, Risks and Potential Complications. *J Clin Med* 2019; **8** [PMID: 31137510 DOI: 10.3390/jcm8050716]
- Simpson RG, Moshirfar M, Edmonds JN, Christiansen SM. Laser in-situ keratomileusis in patients with diabetes mellitus: a review of the literature. *Clin Ophthalmol* 2012; **6**: 1665-1674 [PMID: 23109803 DOI: 10.2147/OPTH.S36382]
- Yoo TK, Oh E. Diabetes mellitus is associated with dry eye syndrome: a meta-analysis. *Int Ophthalmol* 2019; **39**: 2611-2620 [PMID: 31065905 DOI: 10.1007/s10792-019-01110-y]
- Jiang D, Xiao X, Fu T, Mashaghi A, Liu Q, Hong J. Transient Tear Film Dysfunction after Cataract Surgery in Diabetic Patients. *PLoS One* 2016; **11**: e0146752 [PMID: 26771186 DOI: 10.1371/journal.pone.0146752]
- Gemensky-Metzler AJ, Sheahan JE, Rajala-Schultz PJ, Wilkie DA, Harrington J. Retrospective study of the prevalence of keratoconjunctivitis sicca in diabetic and nondiabetic dogs after phacoemulsification. *Vet Ophthalmol* 2015; **18**: 472-480 [PMID: 25429857 DOI: 10.1111/vop.12238]
- The definition and classification of dry eye disease: report of the Definition and Classification Subcommittee of the

- International Dry Eye WorkShop (2007). *Ocul Surf* 2007; **5**: 75-92 [PMID: [17508116](#) DOI: [10.1016/s1542-0124\(12\)70081-2](#)]
- 8 **Malemud CJ**. Matrix metalloproteinases (MMPs) in health and disease: an overview. *Front Biosci* 2006; **11**: 1696-1701 [PMID: [16368548](#) DOI: [10.2741/1915](#)]
 - 9 **Arpino V**, Brock M, Gill SE. The role of TIMPs in regulation of extracellular matrix proteolysis. *Matrix Biol* 2015; **44-46**: 247-254 [PMID: [25805621](#) DOI: [10.1016/j.matbio.2015.03.005](#)]
 - 10 **Sakimoto T**, Shoji J, Yamada A, Sawa M. Upregulation of matrix metalloproteinase in tear fluid of patients with recurrent corneal erosion. *Jpn J Ophthalmol* 2007; **51**: 343-346 [PMID: [17926110](#) DOI: [10.1007/s10384-007-0455-0](#)]
 - 11 **Schultz GS**, Wysocki A. Interactions between extracellular matrix and growth factors in wound healing. *Wound Repair Regen* 2009; **17**: 153-162 [PMID: [19320882](#) DOI: [10.1111/j.1524-475X.2009.00466.x](#)]
 - 12 **Hunter CA**, Jones SA. IL-6 as a keystone cytokine in health and disease. *Nat Immunol* 2015; **16**: 448-457 [PMID: [25898198](#) DOI: [10.1038/ni.3153](#)]
 - 13 **Kamimura D**, Ishihara K, Hirano T. IL-6 signal transduction and its physiological roles: the signal orchestration model. *Rev Physiol Biochem Pharmacol* 2003; **149**: 1-38 [PMID: [12687404](#) DOI: [10.1007/s10254-003-0012-2](#)]
 - 14 **van Greevenbroek MM**, Schalkwijk CG, Stehouwer CD. Obesity-associated low-grade inflammation in type 2 diabetes mellitus: causes and consequences. *Neth J Med* 2013; **71**: 174-187 [PMID: [23723111](#)]
 - 15 **Sakimoto T**, Sawa M. Metalloproteinases in corneal diseases: degradation and processing. *Cornea* 2012; **31** Suppl 1: S50-S56 [PMID: [23038036](#) DOI: [10.1097/ICO.0b013e318269ccd0](#)]
 - 16 **Zhang W**, Magadi S, Li Z, Smith CW, Burns AR. IL-20 promotes epithelial healing of the injured mouse cornea. *Exp Eye Res* 2017; **154**: 22-29 [PMID: [27818315](#) DOI: [10.1016/j.exer.2016.11.006](#)]
 - 17 **Gao X**, Hao L, Wang J, Ma G, Zhang T. Effect of Phacoemulsification Combined with Intraocular Lens Implantation on Inflammatory Factors, Oxidative Stress Response and Hemorheology in Diabetic Cataract Patients. *J Coll Physicians Surg Pak* 2018; **28**: 762-765 [PMID: [30266120](#)]



Published by **Baishideng Publishing Group Inc**
7041 Koll Center Parkway, Suite 160, Pleasanton, CA 94566, USA

Telephone: +1-925-3991568

E-mail: bpgoffice@wjgnet.com

Help Desk: <https://www.f6publishing.com/helpdesk>

<https://www.wjgnet.com>

