

ISSN 0875-5118 (Print)
ISSN 2697-6005 (Online)



จักษุเวชสาร

THE THAI JOURNAL OF OPHTHALMOLOGY

Vol. 35 No. 1 January - June 2021

Original Articles

A Comparative Study of Ocular Hemorrhage in Cataract Surgery Patients Receiving Continuous Antithrombotic and with Preoperative Discontinuation

Kedsanee Coowanitwong, MD

Survey on Contact Lens Hygiene Behaviors and Knowledge in Rajabhat University Students

Atit Koovitsopit, MD, Chantaka Supiyaphun, MD, Passara Jongkhajornpong, MD

Case Report

An Unusual Presentation of Microsporidial Keratitis as Iritis without Corneal Lesion: A Case Report

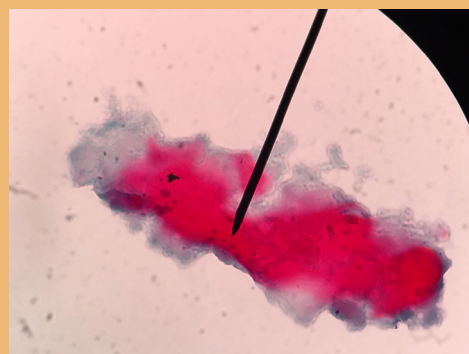
Taniya Bhoopat, MD, Ying Supattanawong, MD, Jeerawat Sawatdiwithayayong, MD

Bilateral Infectious Keratoconjunctivitis, A Way to Recognize Microsporidial Keratitis: A Case Report

Phantaraporn Tangtamaruk, MD, Varintorn Chuckpaiwong, MD

Herpes Zoster Ophthalmicus with Ophthalmoplegia: A Case Report and Review of Literature

SL Loh, MD, WZ Ong, MD, SL Ng, MD





จักษุเวชสาร

The Thai Journal of Ophthalmology

คณะกรรมการบริหารราชวิทยาลัยจักษุแพทย์แห่งประเทศไทย

วาระปี 2564 – 2565

ประธาน	ศ.พญ.วณิชา ชื่นกองแก้ว
รองประธานและประธานคณะกรรมการจริยธรรม	รศ.นพ.อนุชิต ปุณฺณพลวงศ์
เลขาธิการ	พ.อ.นพ.ยุทธพงษ์ อิ่มสุวรรณ
เหรัญญิก	ศ.นพ.นิพนธ์ จิรภาไพศาล
ประธานวิชาการและกิจกรรมสังคม	ศ.วุฒิคุณ นพ.ศักดิ์ชัย วงศกิตติรักษ์
ประธานคณะกรรมการฝึกอบรมและสอบฯ	รศ.นพ.วีระวัฒน์ คิดดี
ประธานคณะกรรมการวิจัย	ศ.นพ.ยศอนันต์ ยศไพบูลย์
ประธานคณะกรรมการเทคโนโลยีสารสนเทศ	นพ.ธนาพงษ์ สมกิจรุ่งโรจน์
ประธานคณะกรรมการนวัตกรรมและเทคโนโลยี	รศ.พญ.สุภาภรณ์ เต็งไตรสรณ์
ประธานฝ่ายวิชาชีพ	รศ.พญ.มัญชิมา มะกรวัฒนะ
กรรมการและที่ปรึกษาทางการเงิน	รศ.(พิเศษ) พญ.โสฬส วุฒิพันธุ์
กรรมการกลาง	ผศ.พญ.วัฒน์ย์ เย็นจิตร
	ศ.พญ.งามแข เรืองวรเวทย์
	รศ.นพ.วิชัย ประสาทฤทธา
	รศ.พญ.วิลาวัลย์ พวงศรีเจริญ
	ศ.(พิเศษ) นพ.พิพัฒน์ คงทรัพย์
	รศ.นพ.ดิเรก ผาติกุลศิลา
	ศ.นพ.แมนสิงห์ รัตนสุคนธ์
	พ.อ.พญ.อรวิสี จตุทอง
	รศ.พิเศษ นพ.บุญส่ง วนิชเวชารุ่งเรือง
	ผศ.นพ.อาทิตย์ แก้วนพรัตน์
	พญ.ดวงดาว ทศณรงค์
	ผศ.นพ.ธนภัทร รัตนภากร



จักษุเวชสาร

The Thai Journal of Ophthalmology

The Royal College Executive Committee

2021 – 2022

President

Wanicha Chuenkongkaew, MD

Vice-President

Anuchit Poonyathalang, MD

Secretary

Yutthaphong Imsuwan, MD

Treasurer

Niphon Chirapapaisan, MD

Scientific Committee

Sakchai Vongkittirux, MD

Chair of Training and Examination Subcommittee

Weerawat Kiddee, MD

Chair of Research Subcommittee

Yosanan Yospaiboon, MD

Chair of Information Technology Division

Thanapong Somkijrungraj, MD

Chair of Innovation and Technology Subcommittee

Supaporn Tengtrisorn, MD

Chair of International Affairs Division

Manchima Makornwattana, MD

Committee and Financial Advisor

Sorot Wutthiphan, MD

Committee

Wataneer Jenchitr, MD

Ngamkhae Ruangvaravate, MD

Wichai Prasariththa, MD

Vilavun Puangsricharern, MD

Pipat Kongsap, MD

Direk Patikulasila, MD

Mansing Ratanasukon, MD

Ornwasee Jatuthong, MD

Boonsong Wanichwecharungruang, MD

Arthit Kaewnopharat, MD

Duangdao Thatsnarong, MD

Tanapat Ratanapakorn, MD

คณะกรรมการวิชาการและกิจกรรมสังคม (Scientific Subcommittee and Social Activities)

ศ.วุฒิคุณ นพ.ศักดิ์ชัย วงศกิตติรักษ์	Sakchai Vongkittirux, MD
นพ.ธนาพงษ์ สมกิจรุ่งโรจน์	Thanapong Somkijrunroj, MD
นพ.วรภัทร วงษ์สวัสดิ์	Warrapat Wongsawad, MD
นพ.ดวงมนตรี โรจน์ดำรงรัตนา	Duangmontree Rojdamrongratana, MD
ศ.นพ.นิพนธ์ จิรภาไพศาล	Niphon Chirapapaisan, MD
รศ.พญ.วิศนี ตันติเสวี	Visanee Tantisevi, MD
ศ.ดร.พญ.เกษรา พัฒนพิฑูรย์	Kessara Pathanapitoon, MD
พญ.ภาวสุทธิ์ สุภาสัย	Pawasoot Supasai, MD
ศ.นพ.แมนสิงห์ รัตนสุคนธ์	Mansing Ratanasukon, MD
พญ.อัจฉรา อัมพรพฤติ	Atchara Amphornphruet, MD
พันเอก พญ.วิวรรณ ศันสนยุทธ	Wiwat Sansanayudh, MD
รศ.นพ.ณพล กาญจนารัตน์	Navapol Kanchanaranya, MD
พญ.อรวิณัฐ นิมิวงศ์สกุล	Ornvenus Nimitwongsakul, MD
รศ.พญ.ดารินทร์ สากิยลักษณ์	Darin Sakiyalak, MD

คณะกรรมการฝึกอบรมและสอบฯ (Training and Examination Subcommittee)

รศ.นพ.วีระวัฒน์ คิตติ	Weerawat Kiddee, MD
รศ.นพ.ภฤศ หาญอุตสาหะ	Prut Hanutsaha, MD
ศ.นพ.โอฬาร สุวรรณอภิชน	Olan Suwan-apichon, MD
ศ.วุฒิคุณ นพ.ศักดิ์ชัย วงศกิตติรักษ์	Sakchai Vongkittirux, MD
พันเอก พญ.รวิวรรณ ชุนถนอม	Raveewan Choontanom, MD
รศ.นพ.พิทยา งามระเวชรธรรม	Pittaya Phamonvaechavan, MD
ผศ.พญ.ธารสุข เกษมทรัพย์	Thanrsook Kasemsup, MD
รศ.พญ.ภารดี คุณาวิศรุต	Paradee Kunavisarut, MD
พญ.มิ่งขวัญ ลำยองเสถียร	Mingkwan Lumyongsatien, MD
ผศ.(พิเศษ) นต.นพ.สุขุม ศิลปะอาชา	Sukhum Silpa-Archa, MD
พญ.วรรณกรณ์ พฤชากร	Vannakorn Pruksakorn, MD
พญ.วันทนี แดงบุญ	Wantanee Dangboon, MD
รศ.พญ.อนิตา มนัสสาร	Anita Manassakorn, MD

คณะกรรมการวิจัย (Research Subcommittee)

ศ.นพ.ยศอนันต์ ยศไพบูลย์
รศ.นพ.ภฤศ หาญอุตสาหะ
ศ.พญ.ภิญญिता ตันธูนิตย์
รศ.นพ.โกศล คำพิทักษ์
ศ.(พิเศษ) นพ.พิพัฒน์ คงทรัพย์
รศ.พญ.เจนจิต ชูฉมยการ
พันเอก พญ.รวีวรรณ ชุนถนอม
ผศ.พิเศษ พญ.สมพร จันทรา
ผศ.พญ.แพร์ พงศาเจริญนนท์
พญ.สิรินยา สุวรรณราช
ผศ.นพ.ยอดพงศ์ จันทரசร
พญ.วรุณกานต์ รุ่งภูวภัทร
รศ.พญ.อรพรรณ อาญาสิทธิ
ศ.พญ.เกวลิน เลขานนท์

Yosanan Yospaiboon, MD
Prut Hanutsaha, MD
Pinnita Tantuvanit, MD
Kosol Kampitak, MD
Pipat Kongsap, MD
Janejit Choovuthayakorn, MD
Raveewan Choontanom, MD
Somporn Chandra, MD
Pear Pongsachareonnont Ferreira, MD
Sirinya Suwannaraj, MD
Yodpong Chantarasorn, MD
Vatookarn Roongpuwapatara, MD
Orapan Aryasit, MD
Kaevalin Lekhanont, MD

คณะกรรมการนวัตกรรมและเทคโนโลยี (Innovation and Technology Subcommittee)

รศ.พญ.สุภาภรณ์ เตังไตรสรณ์
รศ.นพ.ณัฐวุฒิ รอดอนันต์
ศ.(พิเศษ) นพ.พิพัฒน์ คงทรัพย์
รศ.นพ.ณวพล กาญจนารักษ์
ผศ.นพ.ธรรศ สงวนศักดิ์
พันโท พญ.นฤมล แก้วโรจน์
ผศ.พญ.ธิดารัตน์ ลีอังกูเสถียร
ผศ.พญ.เปรมจิต เสาถนานนท์
รศ.พญ.ญาณิน สุวรรณ
นพ.พรพัฒนะ วิจิตรเวชไพศาล
รศ.พญ.อรพรรณ อาญาสิทธิ
นพ.ลั่นหล้า อุดมเวช
พญ.ปณณช พิสิตพายัต
นพ.เกษม เสรีศิริขจร

Supaporn Tengtrisorn, MD
Nuttawut Rodanant, MD
Pipat Kongsap, MD
Navapol Kanchanaranya, MD
Thuss Sanguansak, MD
Narumon Keorochana, MD
Thidarat Leeungurasatien, MD
Preamjit Saonanon, MD
Yanin Suwan, MD
Pornpattana Vichitvejpaisal, MD
Orapan Aryasit, MD
Lunla Udomwech, MD
Punyanuch Pisitpayat, MD
Kasem Seresirikachorn, MD



จักษุเวชสาร

The Thai Journal of Ophthalmology

จักษุเวชสาร เป็นวารสารของราชวิทยาลัยจักษุแพทย์แห่งประเทศไทย และสมาคมจักษุแพทย์แห่งประเทศไทย

คณะกรรมการจักษุเวชสาร

บรรณาธิการ

รศ.นพ.ภฤศ หาญอุตสาหะ

คณะแพทยศาสตร์โรงพยาบาลรามาธิบดี

กองบรรณาธิการ

ศ.พญ.เกวณีน เลขานนท์

คณะแพทยศาสตร์โรงพยาบาลรามาธิบดี

ศ.พญ.วณิชา ชื่นกองแก้ว

คณะแพทยศาสตร์ศิริราชพยาบาล

รศ.พญ.ภิญญานิตา ตันธวัชรัตน์

คณะแพทยศาสตร์ศิริราชพยาบาล

รศ.นพ.สมเกียรติ อัสวภูริกรณ

คณะแพทยศาสตร์ มหาวิทยาลัยขอนแก่น

รศ.นพ.วินัย ชัยตระกูล

คณะแพทยศาสตร์ มหาวิทยาลัยเชียงใหม่

ศ.นพ.แมนสิงห์ รัตนสุคนธ์

คณะแพทยศาสตร์ มหาวิทยาลัยสงขลานครินทร์

ผศ.พอ.หญิง พญ.รวีวรรณ ชุนถนอม

โรงพยาบาลพระมงกุฎเกล้า

นพ.บุญส่ง วนิชเวชารุ่งเรือง

โรงพยาบาลราชวิถี

นพ.ปานเนตร ปางพุฒิพงศ์

โรงพยาบาลเมตตาประชารักษ์ (วัดไร่ขิง)

รศ.(พิเศษ) พญ.โสฬส วุฒิพันธุ์

สถาบันจักษุวิทยา รพ.สงฆ์

Professor Harold Furr

USA

ที่ปรึกษาเกียรติศักดิ์

ศ.นพ.พรชัย สิมะโรจน์

คณะแพทยศาสตร์โรงพยาบาลรามาธิบดี

ศ.นพ.ยศอนันต์ ยศไพบูลย์

คณะแพทยศาสตร์ มหาวิทยาลัยขอนแก่น

เจ้าหน้าที่ประสานงาน

คุณสุวัช ศรีประดิษฐ์

จักษุเวชสาร เป็นวารสารที่มีการทบทวนโดยผู้รู้เสมอ (Peer-review) เผยแพร่แบบฉบับตีพิมพ์ (ISSN 0875-5118) และแบบออนไลน์ (ISSN 2697-6005) จัดทำปีละสองฉบับ มีวัตถุประสงค์เพื่อให้ความรู้ในสาขাজักษุวิทยาที่ทันสมัย สนับสนุนการเรียนรู้ต่อเนื่องทางการแพทย์ เอื้อให้เกิดความร่วมมือ และแลกเปลี่ยนทัศนะในหมู่สมาชิกราชวิทยาลัยและผู้อ่าน

สำนักงาน

ราชวิทยาลัยจักษุแพทย์แห่งประเทศไทย

ชั้น 10 อาคารเฉลิมพระบารมี 50 ปี

เลขที่ 2 ซอยศูนย์วิจัย ถนนเพชรบุรีตัดใหม่ กรุงเทพมหานคร 10310

โทรศัพท์ 027180715-6 อีเมล: admin@rcopt.org

ออกแบบและพิมพ์ที่

สำนักพิมพ์กรุงเทพเวชสาร 3/3 สุขุมวิท 49 แขวงคลองตันเหนือ เขตวัฒนา กรุงเทพฯ 10110

โทร. 02-2587954 โทรสาร 02-258-7954 E-mail: bkkmed@gmail.com



จักษุเวชสาร

The Thai Journal of Ophthalmology

The Journal of the Royal College of Ophthalmologists and Ophthalmological Society of Thailand

Editor

Prut Hanutsaha

Department of Ophthalmology,
Faculty of Medicine Ramathibodi Hospital

Editorial Board

Kaevalin Lekhanon

Faculty of Medicine Ramathibodi Hospital

Wanicha Cheunkongkaew

Faculty of Medicine Siriraj Hospital

Pinnita Tanthuvanit

Faculty of Medicine Siriraj Hospital

Somkiat Asawaphurikorn

Srinagarind Hospital, Khon Kaen University

Winai Chaidaroon

Faculty of Medicine, Chiangmai University

Mansing Ratanasukon

Faculty of Medicine, Prince of Songkhla University

Raveewan Choontanom

King Mongkut Hospital

Boonsong Wanitwacharungreung

Rajvithi Hospital

Pannet Pangputipong

Metta Pracharak (Wat Rai King) Hospital

Sorot Wuttiaphan

Priest Hospital

Professor Harold Furr

USA

Distinguished Advisors

Pornchai Simaraj

Faculty of Medicine Ramathibodi Hospital

Yosanan Yospaiboon

Srinagarind Hospital, Khon Kaen University

Administrative Officer

Suwach Sripradit

The Thai Journal of Ophthalmology (TJO) is a peer-reviewed journal, and is published as printed (ISSN 0875-5118) and online journal (ISSN 2697-6005). The TJO is published biannually, and serves the objectives of providing up to date knowledge in the field of Ophthalmology, supports continuing education, promotes cooperation and sharing of opinion among readers.

Office:

The Royal College of Ophthalmologists of Thailand
10th Floor, Royal Golden Jubilee Building,
2 Soi Soonvijai, Petchburi Road, Bangkok 10310
Phone (+66) (0)27180715, (+66) (0)27180716
E-mail: admin@rcopt.org

Designed and Printed at:

Bangkok Medical Publisher, Ltd. Part.
3/3 Sukhumvit 49, Khlong Ton Nua, Vadhana, Bangkok 10110
Tel. 02-2587954 E-mail: bkkmed@gmail.com



จักษุเวชสาร

The Thai Journal of Ophthalmology

บรรณาธิการแถลง

จักษุเวชสารค่อย ๆ ปรับตัวเข้าสู่การเป็นวารสารอิเล็กทรอนิกส์ เพื่อให้ผู้อ่านสามารถเข้าถึงเนื้อหาในวารสารได้สะดวกยิ่งขึ้น โดยเข้าที่เว็บของราชวิทยาลัยจักษุแพทย์แห่งประเทศไทย (www.rcopt.org/index.php) เลือกแถบ “สำหรับจักษุแพทย์” จะมี drop-down menu เลือกจักษุเวชสาร ก็จะเข้าสู่หน้าที่มีจักษุเวชสารฉบับต่าง ๆ ให้เลือกอ่านได้ และหากสนใจบทความใดก็สามารถดาวน์โหลดได้

บทความในฉบับนี้ มีการศึกษาเปรียบเทียบภาวะเลือดออกในตาของผู้ป่วยผ่าตัดต้อกระจกที่ได้รับยาต้านเกล็ดเลือด โดยพญ.เกศณี คุวณิชย์วงศ์ การผ่าตัดต้อกระจกเป็นหัตถการที่จักษุแพทย์เรากระทำเป็นประจำ จึงน่าจะเป็นเรื่องที่จักษุแพทย์ให้ความสนใจ มีการศึกษาพฤติกรรมการใช้เลนส์สัมผัส นอกจากนี้ ยังมีรายงานผู้ป่วยติดเชื้อ Microsporidia ที่มีอาการที่พบไม่บ่อย และยังมีบทความรายงานผู้ป่วย Herpes zoster ophthalmicus จากผู้เขียนชาวต่างชาติ นับเป็นก้าวเบื้องต้นที่เราจะพัฒนาจักษุเวชสารให้เป็นวารสารวิชาการทางจักษุวิทยาในระดับภูมิภาค

ขอแรงสนับสนุนจากสมาชิก ช่วยกันอ่าน และส่งบทความมาให้จักษุเวชสาร ขอขอบพระคุณในการสนับสนุนที่มีให้ตลอดมา

กองบรรณาธิการ



Guides for Authors

A. Basic Information

The Thai Journal of Ophthalmology (TJO) is a peer-reviewed, scientific journal published biannually for the Royal College of Ophthalmologists of Thailand and the Ophthalmological Society of Thailand. The objectives of the journal is to provide up to date scientific knowledge in the field of ophthalmology, provide ophthalmologists with continuing education, promote cooperation, and sharing of opinion among readers.

The copyright of the published article belongs to the Thai Journal of Ophthalmology. However the content, ideas and the opinions in the article are from the author(s). The editorial board does not have to agree with the authors' ideas and opinions.

The authors or readers may contact the editorial board via email at admin@rcopt.org.

At present, the TJO has evolved into the online journal platform to enhance the efficiency, transparency and of the fairness of the article selection, review and selection. This will improve the quality of the journal to be eligible for the Thai Journal Citation Index. The other benefit of the online journal platform is the articles can reach broader readers.

Authors may submit articles through the Royal College of Ophthalmologists of Thailand's website (<http://www.rcopt.org/>). After clicking "Article Submission" ("ส่งบทความวิชาการตีพิมพ์") the authors may go through the submission processes. Authors who encounter problems during article submission can contact staffs by email. (<http://www.rcopt.org/>)

B. Types of articles

The TJO publishes Original Articles (นิพนธ์ต้นฉบับ), Case Reports (รายงานผู้ป่วย), Reviews (บทความฟื้นฟูวิชาการ), Correspondence (จดหมายถึงบรรณาธิการ), Perspectives and Editorials (บทบรรณาธิการ). Articles submitted for publication should be original, with the understanding that they have not been and will not be published elsewhere. Authors may be requested to provide the data upon which the manuscript is based and answer any question about the manuscript during the peer review process.

Original Articles (นิพนธ์ต้นฉบับ)

Original articles are previously unpublished manuscripts to provide up to date information

to ophthalmic society. They include clinical trials, diagnostic tests, clinically relevant laboratory investigations, other clinical researches, public health or other related basic science researches.

Case Reports (รายงานผู้ป่วย)

Case reports are articles that describe clinical case(s) with unusual presentation, clinical course, and response to management. This includes new modality of management, surgical techniques etc.

Reviews (บทความพินิจวิชาการ)

TJO welcomes authors to submit high quality reviews, systematic reviews, or meta-analysis to provide up to date knowledge for the readers.

Correspondence

Letters about recent articles published in the TJO are encouraged to provide different viewpoint and discussion on the subjects.

Perspectives and Editorials

Perspectives and Editorials are focused opinion on any issues related to ophthalmology, or analytic, interpretative opinion upon the submitted manuscript. These are intended to provide analytical opinion and stimulate discussion among the readers.

C. Manuscript Preparation

It is advised that the manuscript be prepared using Microsoft Word (Version 2013 or later). The manuscript is prepared for A4 paper, using font “Th SarabunPSK”, font size 14 for Thai language; and font “Times New Roman” font size 12 for English language. The paragraph line spacing should be set as single. The figure should be saved separately in high resolution in either TIFF, PNG or JPEG format.

Component of the manuscript are as followings:

1. Cover letter

The cover letter should include the information of the article that the authors would like to convey to the editor. The principal investigator or corresponding author for the article containing original data should confirm in the cover letter that he or she “had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis as well as the decision to submit for publication.”

2. Title page

The title of a manuscript should be as concise and clear as possible. The title page must include:

2.1 Title in English (no more than 140 characters)

2.2 Title in Thai (no more than 200 characters)

2.3 Authors' full name, address, and institutional affiliation (in Thai and English). All authors should provide the financial disclosure.

The editorial board adheres to the recommendation set by the International Committee of Medical Journal Editors (<http://www.icmje.org>) that that authorship be based on the following 4 criteria:

- Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; AND
- Drafting the work or revising it critically for important intellectual content; AND
- Final approval of the version to be published; AND
- Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

2.4 The name, address, phone number, fax number, and e-mail address of the Corresponding Author. The Corresponding Author will be responsible for all questions about the manuscript and for reprint requests. Only one author can be designated as Corresponding Author.

In any study involving human subjects, the authors should declare the approval from the Ethics Committee.

All authors must declare about financial interests in any products mentioned.

Note: Number the pages of the manuscript consecutively, beginning with the Title Page as page 1.

3. Abstract

3.1 Abstract (in English), should not exceed 250 words. If possible, the abstract should be written as structured abstract, which includes: objectives or purpose, methods, main outcome measures, results and conclusions.

3.2 Abstract (in Thai), should not exceed 300 words.

3.3 Key words. The authors may provide 3-6 key words.

4. The article should compose of several sections as necessary. For the original article, the sections should be: introduction, materials and methods, results, discussion and acknowledge.

5. Tables

Each table should be in separate page.

6. Figures

Figures and legends should be separated from the article text. The figures should be saved in TIFF, JPEG, or PNG format. The required minimum resolution for publication is ≥ 350 ppi.

7. References.

The authors should write the references according to the AMA Manual of Style, A Guide for

Authors and Editors, Tenth Edition, ISBN 0-978-0-19-517633-9.

The authors should list up to 3 authors. If there are more than 3 authors, list only 3 authors and followed by et al.

Example of reference writing:

Reference to a journal publication:

1. Wong CW, Yanagi Y, Lee WK, et al. Age-related macular degeneration and polypoidal choroidal vasculopathy in Asians. *Prog Retin Eye Res.* 2016;53:107-139.

Reference to a chapter in an edited book:

2. Mettam GR, Adams LB. How to prepare an electronic version of your article. In: Jones BS, Smith RZ, eds. *Introduction to the Electronic Age.* New York, NY: E-Publishing Inc; 2009:281-304.

Reference to a website:

3. National Health Service (NHS) Diabetic Eye Screening Programme and Population Screening Programmes. Diabetic eye screening: commission and provide. <https://www.gov.uk/government/collections/diabetic-eye-screening-commission-and-provide>. 2015. Accessed September 24, 2017.

D. Editorial Policies for Authors

The authors are responsible to provide the most accurate information and logical interpretation of data. The opinions presented in the article are the authors' opinion. The editorial board may or may not agree with the published opinion.

All authors are required to report potential conflicts of interest related to the article.

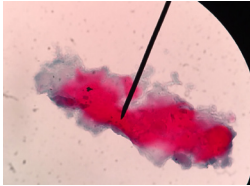
For all manuscripts reporting data from studies involving human participants or animals, formal review and approval, or formal review and waiver, by an appropriate institutional review board or ethics committee is required and should be described in the Methods section.

E. Editorial and Peer Review

All submitted manuscripts are reviewed initially by one of the editors. Manuscripts are evaluated according to the following criteria: material is original and timely, writing is clear, study methods are appropriate, data are valid, conclusions are reasonable and supported by the data, information is important, and topic has general interest to readers of this journal. From these basic criteria, the editors assess a paper's eligibility for publication. Manuscripts with insufficient priority for publication are rejected promptly. Other manuscripts are sent to expert consultants for peer review. Authors' identification are made unknown to the reviewers. Final decision are made by editor in chief.

Authors may appeal decisions. All appeals are reviewed by the editor in chief

ปีที่ 35 ฉบับที่ 1 มกราคม-มิถุนายน 2564



สารบัญ

ภาพปก Gram-chromotrope, showing microsporidial organisms. page 27

vii บรรณาธิการแถลง

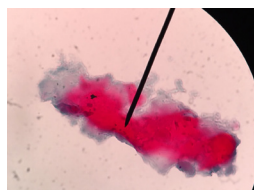
นิพนธ์ต้นฉบับ

- 1 การศึกษาเปรียบเทียบภาวะเลือดออกในตาของผู้ป่วยผ่าตัดต่อกระจกที่รับประทานต้านเกล็ดเลือดหรือยาต้านการแข็งตัวของเลือดต่อเนื่อง และแบบหยุดยาก่อนการผ่าตัด
เกศณี คุวนิชย์วงศ์, พ.บ.
- 11 การสำรวจความรู้และพฤติกรรมการใช้เลนส์สัมผัสในนักศึกษามหาวิทยาลัยราชภัฏสวนสุนันทา
อธิษฐ์ คุวิสิษฐ์โสภิต, พ.บ.
ฉันทกา สุปิพันธ์, พ.บ.
ภัศรา จงขจรพงษ์, พ.บ.

รายงานผู้ป่วย

- 19 รายงานผู้ป่วยกระจกตาติดเชื้อจากเชื้อไมโครสปอริเดียที่มาด้วยอาการนำของม่านตาอักเสบโดยไม่มียโรคที่กระจกตา
ธนียา ภูพัฒน์, พ.บ.
หญิง สุปัตตวงค์, พ.บ.
จิราวัฒน์ สวัสดิ์วิทย์ยะยง, พ.บ.
- 25 รายงานผู้ป่วยกระจกตาติดเชื้อ Microsporidia ทั้งสองข้าง
พันธราภรณ์ ตั้งธรรมรักษ์, พ.บ.
วรินทร์ จักรไพวงศ์, พ.บ.
- 30 Herpes Zoster Ophthalmicus with Ophthalmoplegia: A Case Report and Review of Literature
SL Loh, MD
WZ Ong, MD
SL Ng, MD

Contents



ภาพปก Gram-chromotrope, showing microsporidial organisms. page 27

vii Editor's Note

Original Articles

- 1 **A Comparative Study of Ocular Hemorrhage in Cataract Surgery Patients Receiving Continuous Antithrombotic and with Preoperative Discontinuation**
Kedsanee Coowanitwong, MD
- 11 **Survey on Contact Lens Hygiene Behaviors and Knowledge in Rajabhat University Students**
Atit Koovitsopit, MD
Chantaka Supiyaphun, MD
Passara Jongkhajornpong, MD

Case Reports

- 19 **An Unusual Presentation of Microsporidial Keratitis as Iritis without Corneal Lesion: A Case Report**
Taniya Bhoopat, MD
Ying Supattanawong, MD
Jeerawat Sawatdiwithayayong, MD
- 25 **Bilateral Infectious Keratoconjunctivitis, A Way to Recognize Microsporidial Keratitis: A Case Report**
Phantaraporn Tangtammaruk, MD
Varintorn Chuckpaiwong, MD
- 30 **Herpes Zoster Ophthalmicus with Ophthalmoplegia: A Case Report and Review of Literature**
SL Loh, MD
WZ Ong, MD
SL Ng, MD

A Comparative Study of Ocular Hemorrhage in Cataract Surgery Patients Receiving Continuous Antithrombotic and with Preoperative Discontinuation

การศึกษาเปรียบเทียบภาวะเลือดออกในตาของผู้ป่วยผ่าตัดต้อกระจกที่ได้รับยาต้านเกล็ดเลือดหรือยาต้านการแข็งตัวของเลือดต่อเนื่อง และแบบหยุดยาก่อนการผ่าตัด



Kedsanee Coowanitwong, MD¹

เกศณี คุวนิชย์วงศ์, พ.บ.

Abstract

Objective: To compare the incidence of ocular hemorrhage in cataract surgery between patients who continue antithrombotic and with preoperative discontinuation.

Method: A retrospective cohort study of patients who on antiplatelet or anticoagulant drugs undergoing cataract surgery between January 2020 and December 2020 were eligible in the study. Patients discontinued antithrombotic drugs 5-7 days before surgery (discontinuation group) or continued therapy until the time of surgery (maintenance group). Patients were examined 1 day, 7 days and 1 month postoperatively. Intraoperative and postoperative ocular bleeding and systemic complications were assessed.

Main outcome measures: Intraoperative and postoperative ocular hemorrhage and thromboembolic complications.

Results: 288 eyes of 274 patients were included in the study. The maintenance antiplatelet/anticoagulant group comprised 115 eyes, the discontinuation group comprised 173 eyes. There was no sight threatening intraoperative bleeding. Sixty-eight eyes (40.5%) in the discontinuation antiplatelet group and twenty-six eyes (24.5%) in the maintenance antiplatelet group had subconjunctival hemorrhages ($p=0.01$), associated with local anesthesia (OR 48.78, 95%CI 18.45-

Conflicts of interest: None

Approved from the IRB of Trang Hospital: Research ID003/Study code:02-2564.

Address for correspondence: Department of Ophthalmology, Trang Hospital, 69 khok-khan Rd., Tabtiang, Muang, Trang Province, Thailand, 92000; Tel. (66)896999906 Email: Kedsanee9906@gmail.com

¹Department of Ophthalmology, Trang Hospital

128.97). Using multivariable analysis, maintenance antiplatelet did not increase risk of subconjunctival hemorrhage (OR 0.55, 95%CI 0.27-1.11). There was no significant difference regarding hemorrhages between the discontinuation and the maintenance group in anticoagulant and dual antiplatelet therapy. During the 1-month postoperative period, patient in the discontinuation and the maintenance antiplatelet group had thromboembolic complication 1 case in each group.

Conclusions: Minor ocular hemorrhage occurred 34% of eyes, with no significant difference between discontinuation and maintenance antiplatelet. There was no significant difference in the incidence of sight threatening hemorrhage and systemic complications.

Keywords: cataract surgery, antiplatelet, anticoagulant, complication.

บทคัดย่อ:

การศึกษาเปรียบเทียบภาวะเลือดออกในตาของผู้ป่วยผ่าตัดต้อกระจกที่ได้รับยาต้านเกล็ดเลือดหรือยาต้านการแข็งตัวของเลือดต่อเนื่อง และแบบหยุดยาก่อนการผ่าตัด

เกศณี คูณิชย์วงศ์, พ.บ.

กลุ่มงานจักษุวิทยา โรงพยาบาลตรัง, 69 ถ.โคกซัน ต.ทับเที่ยง อ.เมือง จ.ตรัง 92000

Tel.0896999906 Email: kedsanee9906@gmail.com

ผู้พิมพ์ ไม่มีความเกี่ยวข้องหรือผลประโยชน์กับผลิตภัณฑ์ที่กล่าวถึงในบทความ

วัตถุประสงค์: เพื่อศึกษาเปรียบเทียบภาวะเลือดออกในตาของผู้ป่วยผ่าตัดต้อกระจกที่ได้รับยาต้านเกล็ดเลือดหรือยาต้านการแข็งตัวของเลือดต่อเนื่องและกลุ่มที่หยุดยาก่อนการผ่าตัด

วิธีการวิจัย: เป็นการศึกษาแบบ retrospective cohort ในผู้ป่วยผ่าตัดต้อกระจกของโรงพยาบาลตรังที่ได้รับยาต้านเกล็ดเลือด หรือยาต้านการแข็งตัวของเลือด ระหว่างเดือนมกราคม 2563 ถึงธันวาคม 2563 เปรียบเทียบผู้ป่วย 2 กลุ่ม คือกลุ่มผู้ป่วยที่ได้รับยาต่อเนื่อง และกลุ่มผู้ป่วยที่หยุดยาก่อนการผ่าตัด 5-7 วัน โดยเก็บข้อมูลภาวะเลือดออกในตาและภาวะโรคเลือดอุดตันหลังการผ่าตัด 1 วัน, 7 วัน และ 1 เดือน

ผลการวิจัย: ผู้ป่วย 274 คน (288 ตา) เป็นกลุ่มที่หยุดยา 173 ตา กลุ่มที่รับยาต่อเนื่อง 115 ตา จากการศึกษาไม่พบภาวะเลือดออกในตารุนแรงในผู้ป่วยทั้งหมด พบเลือดออกที่เยื่อตาขาวในกลุ่มที่หยุดยาด้านเกล็ดเลือดมากกว่ากลุ่มที่ไม่หยุดยาอย่างมีนัยสำคัญทางสถิติ ($p=0.01$) จากการวิเคราะห์ความสัมพันธ์ของตัวแปรหลายตัว (multivariable analysis) พบว่าสัมพันธ์กับการฉีดยาชา (OR 48.78, 95%CI 18.45-128.97) ไม่สัมพันธ์กับยาด้านเกล็ดเลือด (OR 0.55, 95%CI 0.27-1.11) และพบภาวะโรคเลือดอุดตันในกลุ่มที่หยุดยา และได้รับยาด้านเกล็ดเลือดต่อเนื่องกลุ่มละ 1 คน

สรุปผล: พบเลือดออกที่เยื่อตาขาวในกลุ่มที่หยุดยาและรับยาด้านเกล็ดเลือดต่อเนื่อง 34% สัมพันธ์กับการฉีดยาชา การรับประทานยาด้านเกล็ดเลือดต่อเนื่องไม่เพิ่มอุบัติการณ์ของการเกิดเลือดออกที่เยื่อตาขาว ไม่พบความแตกต่างเรื่องเลือดออกในตา รุนแรงและการเกิดลิ่มเลือดอุดตัน

คำสำคัญ: cataract surgery, antiplatelet, anticoagulant, complication

ได้รับอนุมัติจากคณะกรรมการจริยธรรมวิจัยในคน Research ID:003/Study code:02-2564

Introduction

Cataract surgery is one of the most common surgeries performed in elderly patients.¹ Long-term use of anticoagulant or antiplatelet therapy, especially in elderly patients, is becoming increasingly common. More than 28% of these patients take aspirin, 2% take clopidogrel and more than 5% take an anticoagulant.² This presents additional challenges in managing those patients requiring cataract surgery. There are risks associated with either stopping or continuing anticoagulant or antiplatelet therapy prior to cataract surgery. If antiplatelet and anticoagulant therapies are continued, there is a risk for serious bleeding complications; however, if these medications are discontinued, there is a risk for thromboembolic complications. A large cohort study has reported that discontinuation of low-dose aspirin results in a 40% increase in the risk of stroke and discontinuing warfarin, risk of stroke increases to 1 in 100.³ For these reasons, American and European guidelines recommend continuing aspirin and warfarin in the perioperative period, unless the risk of bleeding is clearly higher than the risk of cardiovascular events.^{4,5} The 2004 guidelines from the Royal Colleges of Ophthalmologists' in the United Kingdom⁶ recommends that patients taking aspirin should continue it before cataract surgery, and patients taking warfarin should continue this medication, but that international normalized ratio (INR) should be within therapeutic level. The American Academy of ophthalmology recommends continuation of anticoagulants in patients undergoing cataract surgery provided that INR is in the therapeutic range. (I+, good quality, strong recommendation) and aspirin be discontinued preoperatively only if the risk of bleeding outweighs

its potential benefits. (I-, good quality, strong recommendation).⁷ Katz et al. published the results of a large prospective cohort study involving 19,283 cataract surgeries performed at 9 centers in the United States and Canada between June 1995 and June 1997. The authors found that warfarin or aspirin was routinely stopped prior to cataract surgery by 28.3% and 22.5% respectively.⁸ The survey in 2003 from Canadian Society of Cataract and Refractive Surgery members found that the majority of ophthalmologist (74.4%) do not stop either warfarin or aspirin for cataract surgery during the perioperative period.⁹ However, current practice of many ophthalmologists in Thailand discontinue antithrombotic agents before cataract surgery to reduce sight-threatening bleeding complications such as retrobulbar hemorrhage, suprachoroidal hemorrhage, etc.

The purpose of this study was to compare the incidence of ocular hemorrhage and thromboembolic events perioperatively and postoperatively between patients continuing oral antiplatelet or anticoagulant and those who discontinued them.

Methods

This study comprised consecutive patients taking antiplatelet (ASA, Clopidogrel, Cilostazol) or dual antiplatelet or anticoagulant (warfarin, Dabigatran) who had cataract surgery between January 2020 and December 2020 at Trang Hospital. Exclusion criteria were the patients who having cataract surgery combined with trabeculectomy or pars plana vitrectomy and who did not follow-up at 7 days and 1 month. Patients in the discontinuation group stopped therapy 5-7 days before surgery and resumed therapy the next day postoperatively. Patients who take warfarin

have therapeutic range INR (2-3.5) before surgery and no bridging therapy in discontinuation group. Cataract surgery included phacoemulsification, extracapsular cataract extraction (ECCE), Intracapsular cataract extraction (ICCE) and phacoemulsification with pterygium excision. Phacoemulsification was performed through a clear cornea incision. Anesthesia included topical and local anesthesia (subconjunctival injection or retrobulbar block). The surgeon used 1 method of anesthesia for each patient. After surgery, patients were examined at 1 day, 7 days and 1 month by the surgeon. Intraoperative and postoperative visits, patients were assessed for presence of ocular hemorrhage and thromboembolic complications including cerebral and cardiovascular events. Minor hemorrhagic complications were defined as subconjunctival hemorrhage and hyphema. Retrobulbar hemorrhage and suprachoroidal hemorrhage were sight-threatening hemorrhagic complications. The study protocols were accepted by the IRB of Trang Hospital: Research ID003/Study code:02-2564.

Statistical analysis

Statistical analyses were performed using SPSS

version 22. The student t test was used to evaluate continuous variables. Categorical variables were evaluated using the Chi-square test or Fisher exact test. A p-value less than 0.05 was considered statistically significant. Odd ratios were used to quantify association of each variable with causing of ocular hemorrhage. Variables statistically significant in the univariate analysis were included in the multivariable logistic regression model. Data obtained from two eyes of a subject was analysis from one eye only.

Results

Baseline

During the study period, 274 cataract surgery patients (288 eyes) were on antiplatelet or anticoagulant medications. This series represents 19.71% of all cataract surgeries (1,461 eyes) performed at Trang hospital. The number of patients in each group were shown in Table 1. A total of 115 eyes maintained antithrombotic therapy prior to surgery, including 106 eyes (38.7%) continuing antiplatelet, 3 eyes (50%) continuing dual antiplatelet, and 6 eyes (75%) continuing anticoagulant.

Table 1 Oral Antiplatelet and Anticoagulant Medications in Eyes Undergoing Cataract Surgery

Medications	Maintenance (n=eye)	Discontinuation (n=eye)
Antiplatelet		
ASA only	101	147
Clopidogrel only	4	20
Cilostazol (Pletaal)only	1	1
Dual antiplatelet		
ASA+Clopidogrel	2	3
ASA+Cilostazol	1	0
Warfarin	5	2
Dabigatran (Pradaxa)	1	0

Table 2 Demographic characteristics of patients, Types of cataract surgery and Anesthesia

Parameter	Antiplatelet		P-value	Dual antiplatelet		P-value	Anticoagulant		P-value
	D	M		D	M		D	M	
Eye, n	168	106		3	3		2	6	
Sex, n			0.679			1.000			0.429
Male	74	44		2	2		2	2	
Female	94	62		1	1		0	4	
Age, year			0.636			0.606			0.05
Mean \pm SD									
Range	70.41 \pm 8.08	70.89 \pm 8.14		73.33 \pm 2.08	71 \pm 6.93		66 \pm 0.00	77.33 \pm 9.22	
	43-86	50-98		71-75	67-79		66	65-87	
Underlying disease									
DM	95	63	0.638	1	2	1.0	0	0	-
HT	144	82	0.102	2	3	1.0	1	3	1.000
Dyslipidemia	117	82	0.163	0	3	0.1	2	3	0.464
Heart disease	38	28	0.474	2	1	1.0	2	6	0.157
Stroke	64	31	0.134	3	2	1.0	0	4	0.429
Type of Surgery, n			0.473			1.000			1.000
Phaco+IOL	160	99	3	3		2	5		
ECCE+IOL	6	4	-	-		0	1		
ICCE+IOL	1	0	-	-		-	-		
Phaco+IOL+	1	3	-	-		-	-		
Pterygium excision									
Anesthesia, n									
Topical	81	57	0.041	2	2	1.000	0	4	0.046
Subconjunctival	61	22	< 0.001	1	1	1.000	2	1	0.564
Injection									
Retrobulbar block	26	27	0.891	0	0	-	0	1	0.317

D = discontinuation group, M= maintenance group

Table 2 shows patients' demographic data, types of cataract surgery and anesthesia by group. There was no statistically significant difference in age, sex, or underlying diseases between the maintenance group and the discontinuation group.

Phacoemulsification was the most performed cataract surgeries. There were not statistically different concerning types of cataract surgery between the maintenance and the discontinuation group. Topical anesthesia, subconjunctival anesthesia and retrobulbar block were performed 138 patients (50.7%), 83 patients

(30.5%), and 53 patients (18.8%) respectively. All eyes of ECCE and ICCE were performed by retrobulbar block.

The discontinuation antiplatelet group used topical and subconjunctival anesthesia more than the maintenance group with statistically significant ($p = 0.041$, $p < 0.001$ respectively).

There was no difference in type of anesthesia comparing the maintenance dual antiplatelet and the discontinuation group. However, regarding patients who used anticoagulant, the maintenance group

applied topical anesthesia technique more than the discontinuation group ($p = 0.046$).

Complications

Table 3 shows the incidence of ocular hemorrhage and systemic complications. The incidence of subconjunctival hemorrhage was significantly higher in the discontinued antiplatelet group than in the maintenance group ($P = 0.010$). Hyphema, retrobulbar hemorrhage and suprachoroidal hemorrhage were not

found.

To further analysis the associations between the predictor variable for subconjunctival hemorrhage in antiplatelet used patients, 3 eyes were excluded in analysis because they were 2nd eye. Maintenance antiplatelet, type of cataract surgery (cataract surgery with conjunctival excision) and sharp-needle ophthalmic anesthesia were statistically significant in univariate analysis then multivariable logistic regression were conducted in Table 4. The maintenance

Table 3 Incidence of complications by group

Complication	Antiplatelet		P-value	Dual antiplatelet		P-value	Anticoagulant		P-value
	D (n=168)	M (n=106)		D (n=3)	M (n=3)		D (2)	M (6)	
Ocular hemorrhage									
- Subconjunctival hemorrhage	68 (40.5%)	25 (24.5%)	0.010	1 (33.3%)	1 (33.3%)	1.0	1 (50%)	2 (33.3%)	1.00
- Hyphema	0	0		0	0	-	0	0	-
- Retrobulbar hemorrhage	0	0		0	0	-	0	0	-
- Suprachoroidal hemorrhage	0	0		0	0	-	0	0	-
Thromboembolic			1.00			-			-
Complication									
- Myocardial infarction	1	0		0	0		0	0	
- Stroke	0	1		0	0		0	0	

D = discontinuation group, M = maintenance group

Table 4 Multivariable association of antiplatelet, block and type of cataract surgery with subconjunctival hemorrhage

Factor	Odds ratio	95% confident interval	P-value
Maintenance antiplatelet	0.55	0.27-1.11	0.094
Sharp needle local anesthesia (subconjunctival block, retrobulbar block)	48.78	18.45-128.97	< 0.001
Cataract surgery with excision conjunctiva (ECCE, ICCE, phaco with pterygium excision)	8.54	1.07-67.99	0.043

or discontinued antiplatelet in cataract surgery had the same chance of subconjunctival hemorrhage with OR of 0.55 (95%CI 0.27-1.11, $p = 0.094$). Variables that significantly increased risk of subconjunctival hemorrhage were subconjunctival and retrobulbar block (OR 48.78, 95%CI 18.45-128.97, $p < 0.001$) and cataract surgery with conjunctival excision (OR 8.54, 95%CI 1.073-67.986, $p = 0.043$). The dual antiplatelet and anticoagulant group, the number of cases had too small for risk stratification.

Systemic complications occurred in 2 patients. The first patient from the discontinuation antiplatelet group had sudden cardiac arrest due to myocardial infarction 2 days after surgery, the other one patient from the maintenance antiplatelet group had recurrent stroke on day 20th after surgery. For dual antiplatelet and anticoagulant therapy, there was no significant difference between the maintenance group and the discontinuation group in the incidence of perioperative or postoperative ocular hemorrhage and systemic complications.

Discussion

In this study, patients who continued taking antiplatelet or anticoagulant showed no increase in the incidence of sight-threatening ocular hemorrhages. Although, the incidence of subconjunctival hemorrhage was significantly greater in the discontinuation group, this resulted from sharp needle local anesthesia. Multivariate analysis showed that maintenance or discontinued antiplatelet has the same chance of subconjunctival hemorrhage. The significant independent risk factors were sharp needle local anesthesia and cataract surgery with conjunctival excision. Serious hemorrhagic complications from

local anesthesia are very uncommon. This study does not have sufficient statistic power to draw conclusions about the incidence of potentially sight-threatening hemorrhagic local anesthesia complications in patients on antiplatelet or anticoagulant.

Ophthalmic anesthesia

Local ophthalmic anesthesia techniques include needle-based (intraconal retrobulbar, extraconal peribulbar, subconjunctival) or canula-based (sub-Tenon's) blocks. Hemorrhagic complications include retrobulbar hemorrhage (major) and subconjunctival hemorrhage (minor). Data from a survey in 2004 showed that ophthalmologists in Thailand still used retrobulbar block in 30.3% of phacoemulsification, 62.7% of extracapsular cataract extraction, and 81.1% of intracapsular cataract extraction.¹⁰ Incidence of retrobulbar hemorrhage after retrobulbar block in Thailand is 2.2%.¹¹ Severe complications occur more frequently in elderly patients and recent use of anticoagulants but retrobulbar hemorrhage was not found in this study. The risk of retrobulbar hemorrhage in patients taking antithrombotic remains controversial, with the reported incidence ranging from 0.016-1.7%. A prospective study in 1,383 patients concluded that the preoperative use of aspirin or warfarin whether or not they had been discontinued, did not predispose to hemorrhage associated with retrobulbar block.¹² Benzmira et al.² reported on 48,862 patients in the Cataract National Dataset, the patients had significant increase in subconjunctival hemorrhage with clopidogrel (4.4%) and warfarin (3.7%) compared to non-antithrombotic users (1.7%) who had sub-Tenon's or sharp needle anesthesia. In contrast, the case series involved 19,283 cataract surgeries didn't show an

increased risk of medical and ophthalmic hemorrhagic complications during local anesthesia or cataract surgery in routine anticoagulant or antiplatelet use.¹³ A recent systematic review using stricter inclusion criteria concluded that none of the studies revealed significant bleeding related to needle-based blocks when concurrent aspirin, clopidogrel, or warfarin was administered.¹⁴ However, A retrospective study of 160,000 patients who received retrobulbar or peribulbar anesthesia reveals that 3 patients developed a grade IV retrobulbar hematoma (sight-threatening). Of these 3 cases, 1 patient was on dual antiplatelet therapy, 1 was on warfarin, and 1 was on a combination of dual antiplatelet and warfarin therapy.¹⁵ Therefore Royal college of ophthalmologist and British society of Hematology recommended routine cataract surgery under topical or sub-Tenon's anesthesia would be to continue all antithrombotic agents. This contrasts with patients on dual antiplatelet therapy, who may have an increased risk of sight-threatening hemorrhagic complication. This is due to hemorrhagic risks associated with the block rather than the cataract itself.¹⁶ Risk reduction of hemorrhage can achieved with topical anesthesia, which is the most appropriate way for experienced surgeons who can operate on mobile eyes, and for patients who cooperate well while undergoing surgery.

Cataract surgery

Cataract surgeries are considered low risk procedures.¹⁶ Phacoemulsification for cataract surgery is nowadays the standard of care, and significant bleeding is exceedingly rare, even in patients receiving antithrombotic therapy. However, concerns exist when large incision extracapsular cataract extractions are

performed because this surgery has been associated with increased risks of hyphema and suprachoroidal hemorrhage. The incidence of suprachoroidal hemorrhage during cataract surgery ranges from 0.03% in phacoemulsification to 0.13% in extracapsular cataract extractions. The main risk factors for expulsive hemorrhage are advance age, arteriosclerosis, diabetes, hypertension, and local eye conditions (high myopia, glaucoma, recent surgery, choroidal sclerosis).¹⁷ A meta-analysis of 11 studies involving cataract surgery in patients on warfarin reported an increased incidence of minor and self-limiting hemorrhage (hyphema, subconjunctival hemorrhage).¹⁸ The result in several studies show that maintaining an antiplatelet and/or anticoagulant therapy during the perioperative period does not significantly increase the incidence of the potentially sight-threatening complications associated with phacoemulsification.¹⁹

Thromboembolic complications

Thromboembolic complications were reported in 2 cases of this study. There was one death from myocardial infarction in the discontinued antiplatelet group. The other one from the maintained antiplatelet group had recurrent stroke. There was some evidence for increased risk of myocardial ischemia and stroke among routine users of aspirin or warfarin who continued to use these before surgery, compared with those who were not routine users. This increased risk is likely explained by the higher prevalence of pre-existing comorbidities among routine aspirin and warfarin users.

A systematic review by Dunn and Turpin found no significant difference in thromboembolic event rates between different perioperative management

strategies.²⁰ In contrast with a large study investigated the risk of complications from the perioperative use of anticoagulant in 19,283 patients found that the rate of thrombotic complications was much higher on interruption of anticoagulants than the rate of bleeding complications on continued used.¹³ Although the incidence is small but when an event did occur, it was much more serious and led to a significant increase in morbidity and mortality.

The data from this study support the continued use of antiplatelet and anticoagulant agents among routine users because the risk of sight threatening ocular hemorrhage was not increased, even with continuing these medications.

The current study has several limitations. The design was non-randomized, and the sample size was small, the analytical power was not great enough to detect small differences that might have been present. Especially, the numbers of patients on dual antiplatelet or anticoagulant were small. Therefore, clinical application is limited, particularly rare complications. The large sample of randomized controlled trials would be required to determine the safety of continuous antiplatelet and anticoagulant therapy associated with cataract surgery. But randomization is not feasible for these types of studies, as purposeful discontinuation of antithrombotic would unethically raise the risk of thrombotic events.

Conclusions

The results in our study did not found the sight threatening ocular hemorrhage in antithrombotic used patients. We found only minor ocular hemorrhage (34%) that associated with sharp needle local anesthesia and larger excision of cataract surgery. The maintenance

antiplatelet did not increase the bleeding risk. If it appears that antiplatelet or anticoagulant drugs should be discontinued preoperatively, consultation from the surgeon with the patient's attending physicians and multi-disciplinary team is needed. Discussion with patients and their relatives concerning consequences of ocular hemorrhages and risks of thromboembolic events is crucial.

References

1. World Health Organization. A framework and indicators for monitoring VISION 2020-The Right to Sight. Report of a WHO Working Group. Geneva: WHO;2002.
2. Benzimra JD, Johnston RL, Jaycock P, et al. The Cataract National Dataset electronic multicentre audit of 55567 operations: antiplatelet and anticoagulant medications. *Eye (Lond)* 2009;23:10-16.
3. Garcia Rodriguez LA, Cea Soriano L, Hill C, et al. Increase risk of stroke after discontinuation of acetylsalicylic acid: a UK primary care study. *Neurology* 2011;76:740-6.
4. Fleisher LA, Beckman JA, Brown KA, et al. ACC/AHA 2007 guidelines on perioperative cardiovascular evaluation and care for noncardiac surgery: executive summary- a report of American College of Cardiology/ American Heart Association Task Force on Practice Guidelines (writing Committee to Revise the 2002 Guidelines on Perioperative Cardiovascular Evaluation for Noncardiac Surgery). *J AM Coll Cardiol* 2007; 50:1707-32.
5. The Task Force for Preoperative Cardiac Risk Assessment and Perioperative Cardiac Management in Noncardiac Surgery of the European Society of Cardiology (ESC) and endorsed by the European Society of Anaesthesiology (ESA). Guidelines for preoperative cardiac risk assessment and perioperative cardiac management in noncardiac surgery. *Eur Heart J* 2009; 30:2769-12.
6. The Royal College of Ophthalmologist. Cataract Surgery Guidelines. London, UK, Royal College of

- Ophthalmologists. 2004; updated 2010.
7. American Academy of Ophthalmology. Cataract in the adult eye Preferred Practice Pattern. Preferred Practice Pattern. Volume 124, Issue2, PP1-P119, February 01, 2017. <https://doi.org/10.1016/j.ophtha.2016.09.027>
 8. Katz J, Feldman MA, Bass EB, et al. Risks and benefits of anticoagulant and antiplatelet medication use before cataract surgery. *Ophthalmology*. 2003 Sep;110(9):1784-8.
 9. Ong-Tone L, Paluck EC, Hart-Michell RD. Perioperative use of warfarin and aspirin in cataract surgery by Canadian Society of Cataract and Refractive Surgery members: survey. *J Cataract Refract Surg*. 2005;31:991-6.
 10. Chaidaroon W, Tungpakorn N, Puranitee P. Current trends in cataract surgery in Thailand-2004 survey. *J Med Assoc Thai*. 2005;88(Suppl 9):S43-50.
 11. Nakaphongse S, Tulvatana W, et al. Incidence and factors associated with complications after retrobulbar anesthesia in Thailand: results from King Chulalongkorn Memorial Hospital. *Asian Biomedicine*. 2009;3(6):735-8.
 12. Kallio H, Paloheimo M, Maunaksela EL. Haemorrhage and risk factors associated with retrobulbar/peribulbar block: a prospective study in 1383 patients. *Br J Anaesth*. 2000;85:708-11.
 13. Katz J, Feldman MA, Bass EB, et al. Risks and benefits of anticoagulant and antiplatelet medication use before cataract surgery. *Ophthalmology*. 2003;110:1784-8.
 14. Takaschima A, Marchioro P, Sakae TM, et al. Risk of hemorrhage during needle-based ophthalmic regional anesthesia in patients taking antithrombotics: a systematic review. *PLoS One*. 2016;11:e0147227.
 15. Huebert I, Heinicke N, Kook D, et al. Dual antiplatelet inhibition in cases of severe retrobulbar hemorrhage following retrobulbar and peribulbar anesthesia. *J Cataract Refract Surg*. 2015;41:2092-101.
 16. Nathaniel R, Smilowitz, Jeffrey S, et al. Perioperative Cardiovascular Risk Assessment and Management for Noncardiac Surgery. A Review. *JAMA* 2020; 324(3):279-90
 17. Obuchowska I, Mariak Z. Risk factors of massive suprachoroidal hemorrhage during extracapsular cataract extraction surgery. *Eur J Ophthalmol* 2005; 15:712-7.
 18. Jamula E, Anderson J, Douketis JD. Safety of continuing warfarin therapy during cataract surgery: a systematic review and meta-analysis. *Thromb Res*. 2009;124:292-9.
 19. Makuloluwa AK, Tiew S, Briggs M. Perioperative management of ophthalmic patients on anti-thrombotic agents: a literature review. *Eye*. 2019;33:1044-59.
 20. Dunn AS, Turpie AG. Perioperative management of patients receiving oral anticoagulants: a systematic review. *Arch Intern Med*. 2003;163:901-8.

Survey on Contact Lens Hygiene Behaviors and Knowledge in Rajabhat University Students

การสำรวจความรู้และพฤติกรรมการใช้เลนส์สัมผัสในนักศึกษา
มหาวิทยาลัยราชภัฏสวนสุนันทา



Atit Koovisitsopit, MD¹

อติษฐ์ คุวิสิษฐ์โสภิต, พ.บ.

Chantaka Supiyaphun, MD²

ฉันทกา สุปิยพันธุ์, พ.บ.²



Passara Jongkhajornpong, MD^{1*}

ภัศรา จงขจรพงษ์, พ.บ.

Abstract

Objectives: To explore levels of contact lens (CL) knowledge and hygiene behaviors, and to identify risk behaviors associated with CL complication in Rajabhat University students.

Methods: We conducted a cross-sectional study recruiting students from Suan Sunandha Rajabhat University, between July and September 2019. Willing students were asked to enter the study and to complete online questionnaires about CL knowledge and behaviors. Chi-square or Fisher's exact test and logistic regression were used to analyze any association between risk behaviors and CL-related complications.

Results: Of 369 students, 255 (69.1%) were current CL wearers and were included into the analysis. Mean age was 18.8 years with female predominance (241 students, 83.9%). A majority of students used monthly soft CL (249 students, 97.6%). Students with good CL hygiene behaviors and good knowledge were 62.2% and 41.3%, respectively. Seventy-nine (31%) students had ever swum with CL and 29 (11.4%) students had experienced CL-related keratitis. There was a significant association between swimming while wearing CL and CL-related keratitis (Odds Ratio 2.7,

***Corresponding author:** Passara Jongkhajornpong, M.D., Department of Ophthalmology, Faculty of Medicine, Ramathibodi Hospital, Mahidol University, Bangkok, Thailand

Address: 270 Rama VI Road, Thung Phaya Thai, Ratchathewi, Bangkok 10400; Tel: 662-2012729

E-mail: passaraj@yahoo.com

¹Department of Ophthalmology, Faculty of Medicine, Ramathibodi Hospital, Mahidol University, Bangkok, Thailand

²Department of Ophthalmology, Faculty of Medicine Vajira Hospital, Navamindradhiraj University. Bangkok, Thailand

95% CI 1.2-5.9).

Conclusions: We observed insufficient CL hygiene behaviors and knowledge in Rajabhat University students. Swimming with CL was an important risk behavior associated with CL-related keratitis. Educational strategies are required to emphasize the importance of good CL hygiene and raise awareness of CL-related complications among Rajabhat University students.

Keywords: contact lens, hygiene, CL-related keratitis, knowledge

บทคัดย่อ

การสำรวจความรู้และพฤติกรรมการใช้เลนส์สัมผัสในนักศึกษามหาวิทยาลัยราชภัฏสวนสุนันทา

อริษฐ์ คุวิสิฐโสภิต, พ.บ.¹, ฉันทกา สุปิยพันธุ์, พ.บ.², ภัศรา จงจรพงษ์, พ.บ.^{1*}

¹ภาควิชาจักษุวิทยา, คณะแพทยศาสตร์รามธิบดี มหาวิทยาลัยมหิดล กรุงเทพมหานคร

²ภาควิชาจักษุวิทยา, คณะแพทยศาสตร์วชิรพยาบาล มหาวิทยาลัยนวมินทราธิราช กรุงเทพมหานคร

วัตถุประสงค์: เพื่อศึกษาสุขอนามัยและระดับความรู้เกี่ยวกับการใช้เลนส์สัมผัสในกลุ่มนักศึกษามหาวิทยาลัยราชภัฏและศึกษาความสัมพันธ์ระหว่างพฤติกรรมเสี่ยงในการใช้เลนส์สัมผัสที่สัมพันธ์กับการเกิดภาวะแทรกซ้อนจากการใส่เลนส์สัมผัส

วิธีการวิจัย: ผู้วิจัยได้ทำการสำรวจในนักศึกษามหาวิทยาลัยราชภัฏสวนสุนันทาระหว่าง เดือนกรกฎาคมถึงเดือนกันยายน พ.ศ. 2562 อาสาสมัครผู้เข้าร่วมงานวิจัยจะต้องเป็นผู้ที่ใส่เลนส์สัมผัส และสามารถตอบแบบสอบถามออนไลน์เกี่ยวกับความรู้และสุขอนามัยในการใส่เลนส์สัมผัสได้สมบูรณ์ ข้อมูลที่ได้ถูกวิเคราะห์โดยใช้สถิติเชิงพรรณนา และใช้ Chi-square หรือ Fisher's Exact Test และ logistic regression เพื่อหาความสัมพันธ์ระหว่างพฤติกรรมการใช้เลนส์สัมผัสที่เสี่ยงต่อการเกิดภาวะแทรกซ้อนจากการใส่เลนส์สัมผัส

ผลการวิจัย: จากอาสาสมัครที่ร่วมตอบแบบสอบถามทั้งหมด 369 คน พบว่ามีนักเรียนจำนวน 255 (69.1%) คนที่ปัจจุบันใส่เลนส์สัมผัสอยู่และถูกข้อมูลนำมาวิเคราะห์ นักเรียนมีอายุเฉลี่ย 18.8 ปี ส่วนใหญ่เป็นผู้หญิง (83.9%) 90.5% ของนักเรียนทั้งหมดใส่เลนส์สัมผัสชนิดนิ่มรายเดือน 62.2% ของนักเรียนทั้งหมดมีพฤติกรรมการใช้เลนส์สัมผัสในระดับดี ขณะที่นักเรียนเพียง 41.3% ที่มีความรู้เกี่ยวกับสุขอนามัยของการใช้เลนส์สัมผัสในระดับดี มีนักเรียนจำนวน 79 คน (31%) ที่มีพฤติกรรมการใช้เลนส์สัมผัสขณะว่ายน้ำ และนักเรียนจำนวน 29 คน (11.3%) ที่ให้ประวัติเคยเป็นกระจกตาอักเสบจากการใส่เลนส์สัมผัส นอกจากนี้ยังพบว่าการใส่เลนส์สัมผัสขณะว่ายน้ำมีความสัมพันธ์กับประวัติการเป็นกระจกตาอักเสบจากการใส่เลนส์สัมผัสอย่างมีนัยสำคัญที่ $P = 0.01$ (อัตราส่วน Odds = 2.7)

สรุปผลการวิจัย: ผลงานวิจัยชี้ให้เห็นว่า นักศึกษามหาวิทยาลัยราชภัฏยังมีความรู้และสุขอนามัยเกี่ยวกับการใช้เลนส์สัมผัสที่ไม่เพียงพอ และจำเป็นต้องมีการรณรงค์เพื่อให้นักเรียนได้มีความรู้ความเข้าใจที่ถูกต้อง รวมถึงการสร้างตระหนักรู้ถึงภาวะแทรกซ้อนที่สามารถเกิดได้จากพฤติกรรมเสี่ยงในการใช้เลนส์สัมผัส โดยเฉพาะการใส่เลนส์สัมผัสขณะว่ายน้ำซึ่งสัมพันธ์อย่างมีนัยสำคัญกับการเกิดกระจกตาอักเสบจากการใส่เลนส์สัมผัส

คำสำคัญ: เลนส์สัมผัส, พฤติกรรม, ความรู้, นักศึกษามหาวิทยาลัย

Introduction

Nowadays, contact lenses (CL) have become a common modality for refractive error correction among the young population. The objectives of wearing CL in each individual include refractive error correction, cosmesis improvement or other therapeutic reasons.^{1,2} In 2018, based on sales growth, there were approximately 140 million CL wearers worldwide.³ In Japan, there are published studies reporting that the prevalence of CL use was as high as 37.8% among school students.⁴ Considering the rising trend of CL use, the concerns for CL-related complications and associated risk factors should be highly acknowledged.^{5,6} The complications range from mild symptoms of irritation or redness to very severe and vision-threatening corneal infection.⁷ To prevent these complications, every contact lens wearer should have a proper level of CL hygiene behavior and knowledge to counteract with the setback mentioned.^{5,6}

Several published studies have explored CL awareness in different parts of the world.⁸⁻¹¹ It has been demonstrated that adolescent and young adult CL wearers were more likely to develop eye infections and were more likely to have poor contact lens hygiene practices compared to older adult CL wearers.⁶ In 2014, a study in Rome, Italy showed that not many students took good care of their CL. For example, as many as 52.3% of all students continued to wear a CL after it had fallen into the sink.⁸ In 2017, another study in Chengdu, China, the results showed that CL wearers had limited knowledge about CL hygiene and that only 22.22% of all participants said that they visit eye doctors when they feel discomfort.⁹ In 2019, a study in Malaysia revealed that as much as half of all volunteered students had inadequate CL knowledge.¹⁰ On the contrary, the

recent study from Jordan has shown a moderate to high level of compliance about CL caring in volunteered university students.¹¹

In Thailand, the information on CL knowledge and hygiene in the young generation is limited. Countable studies were conducted at Chulalongkorn University, Thammasat University, Burapha University and Vajira Hospital, which studied different populations and provided different results.¹²⁻¹⁵ Since the population coverage is still inadequate, and the results are specific for each population, further studies are required to obtain more information of CL hygiene in Thai university students.

Therefore, in this study, we aimed to investigate Rajabhat University students, who were considered as a population at risk for having CL-related complications. Our results could be an important primer for establishing regulations or policy for preventing severe CL-related complications among young generations in Thai society.

Methods

A cross-sectional study was conducted in Suan Sunandha Rajabhat University, Bangkok, during July to September 2019. The complete protocol was approved from the Ethics Committee of Ramathibodi Hospital, Mahidol University in an accordance with the Declaration of Helsinki. All students were informed and asked for consent before entering the study.

Students were asked to complete the online questionnaire about CL knowledge and hygiene behaviors. The inclusion criteria were current CL wearers within one year and aged of 18-24 years. Any volunteer students who could not submit complete online forms were excluded. The online questionnaires

Table 1 Association between contact lens (CL) behaviors and history of CL-related keratitis

Contact lens behaviors	Categories	No. of students	History of CL-related keratitis		Odds ratio (95% CI)	P-value
			No (%)	Yes (%)		
Purchase lens from flea market or internet	Yes	169	150 (88.76)	19 (11.24)	1.14	0.747
	No	79	69 (87.34)	10 (12.66)	(0.50, 2.59)	
Use big-eye CL	Yes	103	132 (86.84)	20 (13.16)	1.58	0.278
	No	152	94 (91.26)	9 (8.74)	(0.69, 3.63)	
Wearing time per day	> 12 hours	181	156 (86.19)	25 (88.63)	2.80	0.064
	≤ 12 hours	74	70 (94.59)	4 (5.41)	(0.94, 8.36)	
Sleep with CL	Yes	76	66 (86.84)	10 (13.16)	1.28	0.559
	No	179	160 (89.39)	19 (10.61)	(0.56, 2.89)	
Use tap water for rinsing/cleaning lens	Yes	39	32 (82.05)	7 (17.95)	1.93	0.166
	No	194	194 (89.81)	22 (10.19)	(0.76, 4.88)	
Share CL with friends	Yes	12	9 (75)	3 (25)	2.78	0.143
	No	243	217 (89.30)	26 (10.70)	(0.71, 10.93)	
Swim with CL	Yes	79	64 (81.01)	15 (18.99)	2.71	0.013*
	No	176	162 (92.05)	14 (7.95)	(1.24, 5.94)	
Wash hands before touching CL	Yes	203	181 (89.16)	22 (10.84)	0.78	0.596
	No	52	45 (86.54)	7 (13.46)	(0.31, 1.94)	
Change lenses according to the schedule	Yes	165	147 (89.09)	18 (10.91)	0.88	0.752
	No	90	79 (87.78)	11 (12.22)	(0.39, 1.95)	
Change CL solution everyday	Yes	196	174 (88.78)	22 (11.22)	0.94	0.892
	No	59	52 (88.14)	7 (11.86)	(0.38, 2.32)	
Change CL case at least every 3 months	Yes	227	203 (89.43)	24 (10.57)	0.65	0.590
	No	13	11 (84.62)	2 (15.38)	(0.14, 3.11)	

CI = confidence interval, * Statistically significant at P-value < 0.05

were modified from the previous study,¹³ comprising of 3 sections (demographic data, hygiene behaviors and CL knowledge), as shown in Table 1. A participant with good knowledge is determined by a student with more than 80% correct answers in the hygiene knowledge section.

For statistical analysis, the collected data were demonstrated using descriptive statistics. Chi-square or Fisher's exact test and logistic regression were used to analyze any association between risk behaviors and CL-related complications. A P-value of < 0.05 was considered as statistically significant. All analyses

were conducted using STATA version 16.0 (StataCorp; LLC College Station, TX).

Results

Of 369 volunteered students, 255 current CL wearers (69.1%) were included into the analysis. Mean age was 18.8 years (range from 18 to 24 years). There were 213 females (83.5%) and 42 males (16.5%). Almost all students wore soft CL (246 students, 96.4%) and 231 students (90.5%) used monthly disposable type. The objectives of wearing CL were mainly for refraction correction (222 students, 87%) followed by

cosmetic improvement (33 students, 13%). Important factors considered prior to purchasing lenses were the comfort during CL wear (183 students, 71.7%) and CL brand (39 students, 15.3%). Three most common places to buy CL were optical shops (163 students, 63.9%), markets (34 students, 13.3%) and online shops (32 students, 12.5%).

Contact lens hygiene behaviors

We found that up to 76 students (29.8%) wore CL during sleep. Seventy-nine students (30.9%) wore CL while swimming. Thirty-eight students (14.9%) used tap water for rinsing lenses. Only 12 students (4.7%) shared CL with friends. Two hundred twenty-eight (90.5%) changed CL container within 3 months and 196 students (76.8%) changed CL solution every day. Twenty-two students (8.6%) missed changing CL within the advised period. Up to 205 students (80%) regularly washed their hands before wearing CL. One hundred sixty-nine students (66.2%) never visited an ophthalmologist to have an eye check up.

Contact lens knowledge

One hundred seventy-eight students (69.8%) had proper knowledge about overnight use of CL. Two hundred forty-six students (96.4%) knew not to share CL with others. Two hundred thirty students (90.1%) knew that they should not use CL over the advised duration. Two hundred twenty-seven students (89.0%) knew that they should not wear CL during swimming. Two hundred forty-seven students (96.8%) knew that they should not use tap water as a CL cleanser. Two hundred forty-one students (94.5%) knew that they should change CL solution every day. One hundred ninety-four students (76.0%) knew that they should change CL cases every 3 months.

Contact lens-related complications

Twenty-nine students (11.3%) had history of corneal infection. For knowledge of CL-related complications, 222 (87.0%) students knew at least one CL-related complication; 223 (87.4%) students answered dry eye and itchiness, 89 (34.9%), 103 (40.3%), and 73 (28.6%) students answered corneal abrasion, corneal ulceration, and corneal neovascularization, respectively.

When students found out that they had developed CL-related complications, 238 students (93.3%) suddenly removed their CL, 34 students (13.3%) visited an ophthalmologist as soon as possible and 16 students (6.2%) insisted to wear CL through the regular use period.

Association between contact lens hygiene behaviors and contact lens-related keratitis

From the study, we observed and analyzed many interesting CL-related behaviors including purchase of CL from unauthorized sellers, using big-eyed CL, CL wearing time, sleeping with CL, using tap water to clean CL, sharing CL with friends, swimming with CL, handwashing before wearing CL, on-schedule CL change, CL solution changing period and CL case changing period. Then, the history of CL-related keratitis was taken into consideration with the presence of each aforementioned behavioral risk.

Of all analyzed behavior data, swimming with CL was the only CL-related behavior that was related with keratitis with statistical significance. We found that 79 (30.9%) students had history of swimming with CL and 29 (11.4%) students had experienced CL-related keratitis. 15 students (18.99%) who used to swim with CL had a positive history of CL-related keratitis. There

was a significant association between swimming with CL and CL-related keratitis with odds Ratio at 2.71, 95% CI from 1.2 to 5.9 and p-value at 0.013. For CL wearing time of more than 12 hours and sharing CL with friends, there were notable correlations (Odds ratio 2.8 and 2.78, respectively) but was statistically insignificant (p-value 0.64 and 0.142, respectively).

Overall, a student with good behavior is determined by answering more than 80% of the hygiene behavior section questions correctly. The number of students with good behavior was 159 (62.2%). The number of students with good knowledge was 105 (41.3%).

Discussion

Most overseas surveys reported a high proportion of poor lens hygiene among CL users, especially in young population.^{7,9,10} In our study, the mean age of students was 19 years, which is considered young, and this group is prone to have poor CL hygiene. The main purpose of CL use was for refractive error correction, similar to previous studies in Italy⁸ and some studies in Thailand¹²⁻¹⁵, but not in Malaysia (Cosmetic 58% and Comfort 24.6%, respectively) 10 or Chengdu, China (Aesthetic 57.9% and Refractive correction 34.6%, respectively)⁹. The most common purchase place was the optical shop from studies in Chengdu, China, Thammasat University, Burapha University and Vajira Hospital^{9,13-15}, which is a good and safe decision made by our participants. In contrast, a study in a rural area of Malaysia reported as many as half of the participants had purchased CL from unlicensed vendors. This may be the result of improper decision-making since participants were only teenagers who were not as educated as university students.

For CL hygiene behavior, a majority of our

students selected correct answers, which can represent favorable CL hygiene status. However, up to 30% of students wore CL during sleeping and swimming. Malpractice involving wearing CL while swimming was also observed in Malaysia and Thammasat University in a similar ratio (34.3% and 24.5%, respectively).^{10,13} These two behaviors are worth mentioning and emphasized among young CL wearers. Only 61.3% of our students had good CL hygiene behavior (having correct behaviors > 80%). The number was less than the result reported at Chulalongkorn University that found up to 77% of all participants had good practice level (80-100% of total score).¹² The explanation for the difference between level in both studies may be from the difference in baseline characteristics of each group, which accounted for up to 21% of all students (much more than the proportion in our study-0.8%, 2 students from nursing faculty) of which those who were studying in health science fields at Chulalongkorn University (e.g., Medicine, Dentistry).¹²

For the CL-related hygiene knowledge evaluation, questions in this section were correlated to questions in the behavior section. We found that up to 30.1% of students agreed with the idea to wear CL overnight and up to 24% of students disagreed about replacing the container within a 3-month period. Other responses in the knowledge section were favorable since the misunderstanding was observed in less than 10% of students. However, only 41.3% of our participants had good CL knowledge (answering correctly > 80%). This result was worse than those shown in previous studies from Malaysia and from Chulalongkorn University in Thailand, which reported the study group to have high level of knowledge of up to 56.5% and 73.2%, respectively.^{10,12} For example, in our study, 70% of

our students believed that sleeping with CL is safe. But over 95% of participants in the Chulalongkorn University study considered it dangerous. Also, only 70% of our students realized that the CL case should be replaced every 2-3 months. This question was not enlisted in other studies' questionnaires. Regarding knowledge about CL-related complications in our students, dry eye symptoms and itchiness were well recognized by more than 80% of students, while corneal abrasion, corneal ulcer and corneal neovascularization were poorly recognized (less than 40% of students). In 2015, a study was conducted among first year university students of Burapha University, the results showed that participants had inadequate CL-related hygiene knowledge and improper hygiene behavior.¹⁴ Later, a study at Thammasat University revealed that medical students had better knowledge and behavior than non-medical students.¹³ Recently, there was a study that was conducted among medical students and medical residents in Vajira Hospital. The results showed that both groups had good CL-related hygiene knowledge but the hygiene behavior was different between the two groups of students with less proportion of good behavior observed in the medical resident group.¹⁵

We found that 11.3% of students had history of corneal infection. Moreover, as many as 66.2% of students had never visited an ophthalmologist for an evaluation before and after using CL. Similar results were identified from the study in Chengdu, China.⁹ These results highlight that clinic visits for eye check up were neglected by most of CL wearers. Interestingly, we found that swimming with CL had a significant association with CL-related keratitis (OR 2.71; 95% CI 1.24-5.94). No other risk behaviors were found to be significant in our study. Our findings support recent

evidence which stated that CL guidelines should clearly advocate for the avoidance of any water exposure including handling CL with wet hands, rinsing CL or storage cases in tap water, showering while wearing CL and swimming with CL without wearing goggles.¹⁸

This study had some limitations. It was conducted at only one Rajabhat University in Bangkok, hence our results might not represent the overall situation of general university students in Thailand. All participants were voluntarily enrolled which could have a possible bias on the results due to selection bias. Additionally, current CL wearer in this study was defined as students who used CL within one year from the survey period, therefore recall bias could not be ruled out. The questionnaire mostly contained close-ended questions without rating scales, which might not cover all possible answers and did not provided detailed information for subgroup analysis. History of CL-related keratitis was obtained from participants, not from medical records, that could be suffered from diagnostic uncertainty and recall bias. However, this is the first survey in Rajabhat University students and contains a large number of participants compared to previous studies conducted in Thailand. Our study also provides the information for application in youth population with high risk for having CL-related complications.

In conclusion, insufficient CL hygiene behaviors and knowledge were observed in Rajabhat University students. Most students were unaware of CL-related complications and were conscious about eye examinations at both prior to and after wearing CL. Swimming with CL was an important risk behavior associated with CL-related keratitis in our students. Educational strategies to emphasize the importance of good CL behaviors and public policy for CL

wearers should be established together with raising an awareness of CL-related complications to prevent negative consequences from CL wear in young population.¹⁹

Acknowledgement

The authors would like to thank staffs of Suan Sunandha Rajabhat University, Bangkok for the opportunity to perform the study.

Conflict of interest and financial disclosure

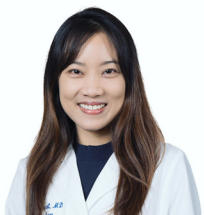
None

References

1. Sankaridurg P. Contact lenses to slow progression of myopia. *Clin Exp Optom*. 2017 Sep;100(5):432-7.
2. Rath V, Mandathara PS, Dumpati S. Contact lens in keratoconus. *Indian J Ophthalmol*. 2013 Aug;61(8):410-5.
3. Lim, Chris, Stapleton, Fiona, Mehta, Jodhbir. Review of Contact Lens-Related Complications, Eye & Contact Lens: Science & Clinical Practice: November 2018;44:S1-10.
4. Uchino M, Dogru M, Uchino Y, et al. Japan Ministry of Health study on prevalence of dry eye disease among Japanese high school students. *Am J Ophthalmol*. 2008 Dec;146(6):925-9.e2.
5. Cope JR, Collier SA, Rao MM, et al. Contact Lens Wearer Demographics and Risk Behaviors for Contact Lens-Related Eye Infections--United States, 2014. *MMWR Morb Mortal Wkly Rep*. 2015 Aug 21;64(32):865-70.
6. Cope JR, Collier SA, Nethercut H, et al. Risk Behaviors for Contact Lens-Related Eye Infections Among Adults and Adolescents - United States, 2016. *MMWR Morb Mortal Wkly Rep*. 2017 Aug 18;66(32):841-5.
7. Li W, Sun X, Wang Z, et al. A survey of contact lens-related complications in a tertiary hospital in China. *Cont Lens Anterior Eye*. 2018 Apr;41(2):201-4.
8. Abbouda A, Restivo L, Bruscolini A, et al. Contact Lens Care among Teenage Students in Italy: A Cross-Sectional Study. *Semin Ophthalmol*. 2016;31(3):226-32.
9. Zhu Q, Yang B, Deng N, et al. The use of contact lenses among university students in Chengdu: Knowledge and practice of contact lens wearers. *Cont Lens Anterior Eye*. 2018 Apr;41(2):229-33.
10. Mohd-Ali B, Tan XL. Patterns of Use and Knowledge about Contact Lens Wear amongst Teenagers in Rural Areas in Malaysia. *Int J Environ Res Public Health*. 2019 Dec 17;16(24):5161.
11. Bakkar MM, Alzghoul EA. Assessment of compliance with contact lens wear and care among university-based population in Jordan. *Cont Lens Anterior Eye*. 2020 Aug;43(4):395-401.
12. Wongkrajang P, Neeser KJ. Knowledge, Attitude, Practice and Eye Problems from Contact Lens Use in Students at Chulalongkorn University 2010, *J Health Res*. 2010;26(3):113-8.
13. Supinda Leeamornsiri, Yothin Titawattanukul, Comparative Knowledge and Behavior of Contact Lens Care between Medical and Non-Medical Students, *J Med Assoc Thai*. 2015;98(Suppl 3):S23.
14. Luksanaporn Krungkraipetch, Knokwan Wongsuwan, Knowledge, Attitude and Behavior Toward Utilization of Contact Lens Among First Year Students in Burapha University, *Burapha journal of medicine*. 2015;2(2).
15. Chantaka Supiyaphun, Pucharut Preechaharn, Knowledge and Behavior of Contact Lens Wear in Medical Students and Medical Residents in Vajira Hospital, *Vajira Med J*. 2020; 64(4):275-86.
16. Blümle S, Kaercher T, Khairuddin R. Richtige Kontaktlinsenhygiene [Correct contact lens hygiene]. *Ophthalmologe*. 2013 Jun;110(6):522-7. German.
17. Jun J, Zhiwen B, Feifu W, et al. Fan, Level of compliance in Orthokeratology. *Eye Contact Lens*. (2018;44:330-4.
18. Arshad M, Carnt N, Tan J, Ekkeshis I, Stapleton F. Water Exposure and the Risk of Contact Lens-Related Disease. *Cornea*. 2019 Jun;38(6):791-7.
19. R. Gyawali, F. Nestha, Mohamed, et al., Compliance and hygiene behaviour among soft contact lens wearers in the Maldives. *Clin Exp Optom*. 2014;97:43-47.

An Unusual Presentation of Microsporidial Keratitis as Iritis without Corneal Lesion: A Case Report

รายงานผู้ป่วยกระจกตาติดเชื้อจากเชื้อไมโครสปอริเดียที่มาด้วยอาการนำของม่านตาอักเสบโดยไม่มีรอยโรคที่กระจกตา



Taniya Bhoopat, MD¹

ธนียา ภูพัฒน์, พ.บ.¹

Ying Supattanawong, MD¹

หญิง สุพัฒน์วงศ์, พ.บ.¹

Jeerawat Sawatdiwithayayong, MD¹

จีราวัฒน์ สวัสดิวิทย์ยะยง, พ.บ.¹

Abstract

Objective: To describe a case of microsporidial keratitis presented with iritis without corneal infiltration mimicking herpes infection.

Case presentation: A 61-year-old woman presented with acute red eye with inflammatory reaction and keratic precipitates in her right eye. There was no corneal infiltration. She was diagnosed with iritis and treated with topical steroid. The inflammation recurred and stromal infiltration developed. Herpes keratouveitis was the most suspected cause. After ten months of treatment, steroid drops and antiviral medication could not control the inflammation. The diagnostic polymerase chain reaction was done twice, and the result showed negative for herpesviruses. Corneal biopsy was performed. The result revealed the diagnosis of microsporidial stromal keratitis. Therapeutic penetrating keratoplasty was later performed. Numerous acid-fast oval bodies were demonstrated in corneal button, confirming the diagnosis.

Conclusions: Iritis could be the initial manifestation before stromal infiltration develops in microsporidial stromal keratitis, mimicking herpes etiology. Aqueous PCR and corneal biopsy should be performed in recalcitrant cases.

Keywords: stromal keratitis, microsporidia, iritis, atypical presentation, therapeutic keratoplasty

The authors report no conflict of interest.

Corresponding author: Taniya Bhoopat, MD, Department of Ophthalmology, Faculty of Medicine, Naresuan University, Phitsanulok, Thailand

Address: Department of Ophthalmology, Faculty of Medicine, Naresuan University, Phitsanulok-Nakornsawan Road, Thapho, Muang, Phitsanulok 65000 Tel: 055 965056

Email address: jataniya59@gmail.com

บทคัดย่อ

รายงานผู้ป่วยกระจกตาติดเชื้อจากเชื้อไมโครสปอริเดียที่มาด้วยอาการนำของม่านตาอักเสบโดยไม่มีรอยโรคที่กระจกตา

¹ภาควิชาจักษุวิทยา คณะแพทยศาสตร์ มหาวิทยาลัยนครสวรรค์

ถ.พิษณุโลก-นครสวรรค์ ต.ท่าโพธิ์ อ.เมือง จ.พิษณุโลก 65000 โทร: 055 965056

วัตถุประสงค์: เพื่อรายงานเคสผู้ป่วยกระจกตาติดเชื้อจากเชื้อไมโครสปอริเดียที่มาด้วยอาการนำของม่านตาอักเสบ โดยไม่มีรอยโรคที่กระจกตา คล้ายการติดเชื้อไวรัสกลุ่มเฮอร์ปีส์

รายงานผู้ป่วย: ผู้ป่วยหญิงอายุ 61 ปี มาด้วยตาแดงเจ็บปวดตาขวา ร่วมกับตรวจพบการอักเสบในช่องหน้าลูกตา โดยไม่พบการอักเสบที่กระจกตา ผู้ป่วยได้รับการวินิจฉัยเป็นม่านตาอักเสบและได้รับการรักษาด้วยยาหยอดตาสเตียรอยด์ ต่อมาการอักเสบกลับเป็นซ้ำและเริ่มมีการอักเสบที่กระจกตาร่วมด้วย จึงสงสัยภาวะกระจกตาอักเสบร่วมกับม่านตาอักเสบจากการติดเชื้อไวรัสกลุ่มเฮอร์ปีส์มากที่สุด หลังจากได้รับการรักษาด้วยยาหยอดตาสเตียรอยด์และยาต้านไวรัสเป็นเวลาสิบเดือน การอักเสบไม่สามารถควบคุมได้ ผู้ป่วยได้รับการเจาะน้ำในช่องหน้าลูกตาเพื่อตรวจโพลีเมอร์เรสเซนรีแอกชั่นสองครั้งเพื่อหาเชื้อไวรัสกลุ่มเฮอร์ปีส์ ซึ่งให้ผลไม่พบเชื้อ ผู้ป่วยได้รับการตัดชิ้นเนื้อกระจกตาเพื่อส่งตรวจ พบการติดเชื้อไมโครสปอริเดียที่กระจกตาชั้นสโตรมา ผู้ป่วยจึงได้รับการรักษาด้วยการผ่าตัดเปลี่ยนกระจกตา ผลชิ้นเนื้อจากกระจกตาของผู้ป่วยพบลักษณะรูปร่างวงรีติดสีแอสิดฟาสต์จำนวนมาก ซึ่งเป็นลักษณะของเชื้อไมโครสปอริเดีย ช่วยยืนยันการวินิจฉัย

สรุป: ผู้ป่วยกระจกตาอักเสบจากเชื้อไมโครสปอริเดียอาจมาด้วยอาการนำของม่านตาอักเสบก่อนที่จะมีกระจกตาอักเสบตามมา คล้ายการติดเชื้อไวรัสกลุ่มเฮอร์ปีส์ ควรทำการตรวจน้ำในช่องหน้าลูกตาและตัดชิ้นเนื้อกระจกตาส่งตรวจในกรณีที่ไม่ตอบสนองต่อการรักษา

คำสำคัญ: stromal keratitis, microsporidia, iritis, atypical presentation, therapeutic keratoplasty

Introduction

Microsporidia are obligate intracellular parasites. They were thought to be “Protozoan” but genetic studies indicate that they are highly defined “fungal” organisms.¹ The first identified microsporidia were found infecting silkworms. They are known to infect fish, birds, insects, and even humans.² Microsporidia only grow inside a host organism’s cells, making them more difficult to study than other pathogens, unlike most bacteria, which can be grown in a petri dish and manipulated. Microsporidia can infect gastrointestinal, sinus, pulmonary, muscular, renal, central nervous, and ocular systems.³ Ocular involvement affects mostly the cornea and conjunctiva in both healthy and immunocompromised individuals.

Microsporidial keratitis has been described as having two distinct clinical features, which are superficial keratoconjunctivitis and deep stromal keratitis. Herein, we report a case of microsporidia stromal keratitis that presented with recurrent iritis without corneal infiltration mimicking herpes infection.

Case Report

A 61-year-old healthy woman presented with acute red eye and foreign body sensation in her right eye for 3 days. The best-corrected visual acuity was 20/20. Slit lamp examination showed 0.5 plus cell without flare (according to the Standardization of Uveitis Nomenclature criteria). Few fine stellate keratic precipitates (KPs) were found. There was definitely

no infiltration on the cornea. The iris and intraocular pressure were normal. No history of herpetic infection, ocular trauma or surgery, and other ocular problems were stated. She was diagnosed with acute iritis in her right eye and treated with topical steroid. After tapering the drops, the inflammation recurred. Viral etiology was suspected due to fine diffuse stellate KPs, corneal hypoesthesia, and rapid recurrence with sole steroid treatment. Paracentesis was done for diagnostic polymerase chain reaction (PCR) and the result showed negative for five viral organisms, including herpes simplex virus type 1 (HSV-1), herpes simplex virus type 2 (HSV-2), varicella zoster virus (VZV), cytomegalovirus (CMV), and Epstein-Barr virus (EBV). Despite the negative result, herpes was still the most suspicious cause, so oral antiviral medication was prescribed along with topical steroid. Patient received acyclovir 400 milligrams administered five times a day for ten days. The inflammation subsided gradually, but one month later, infiltration developed. Slit lamp examination revealed eccentric interstitial whitening in the anterior stroma of right cornea, three millimeters in size combined with coarse punctate epithelial lesions and minimal filamentary keratitis.

Furthermore, intraocular pressure was elevated. Herpes stromal keratitis was suspected. She was treated with oral antiviral medication with topical steroid. Antiviral prophylaxis was recommended due to multiple recurrences of keratouveitis.

After ten months of waxing and waning symptoms, topical steroid and antiviral medication could not control the inflammation in her right eye. Eccentric greyish white infiltration increased in size and depth to full thickness of corneal stroma in the absence of epithelial ulceration (Figure 1). Diffuse fine KPs turned to large central KPs. She had aggressive irritation, pain, and tearing. PCR was repeated, and the result showed negative again. At this time, microsporidial stromal keratitis was suspected, and corneal biopsy was performed. The modified acid-fast staining of corneal tissue revealed some small oval-shaped organisms which were compatible with microsporidia. The patient was then diagnosed with microsporidial stromal keratitis and treated with topical moxifloxacin and oral albendazole. Due to poor response to medical treatment, she underwent therapeutic penetrating keratoplasty. Numerous intracellular and extracellular acid-fast oval bodies, measuring 1-3 micron were demonstrated

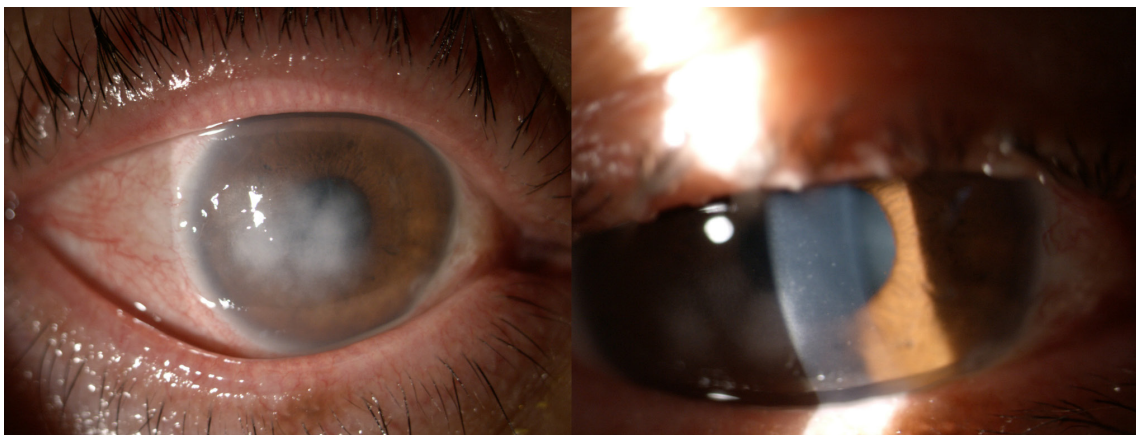


Figure1 Deep stromal infiltration developed after iritis.

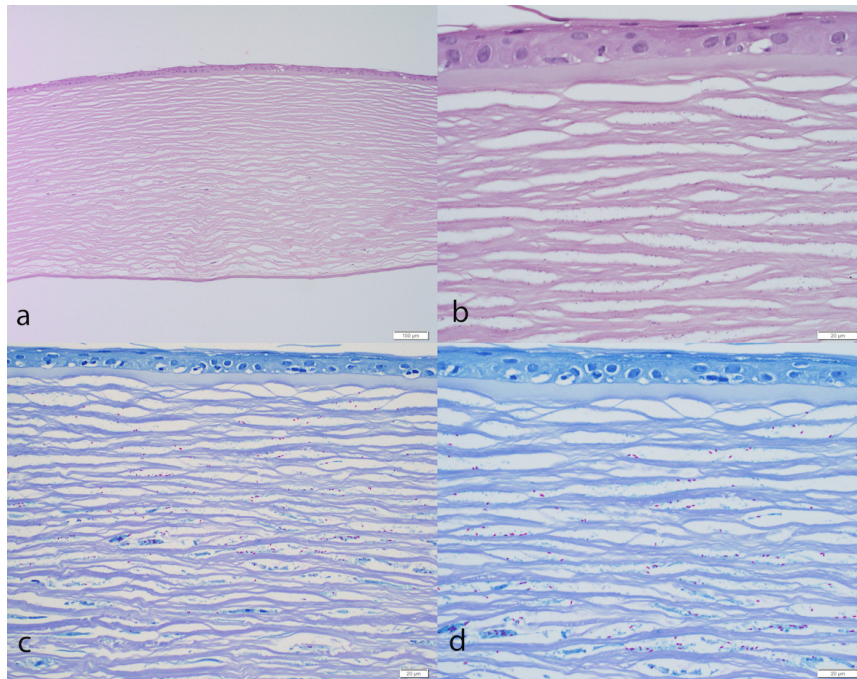


Figure 2 H&E and modified AFB staining showed oval bodies in corneal stroma; a) H&E 100X; b) H&E 600X; c) mAFB 400X; d) mAFB 600X

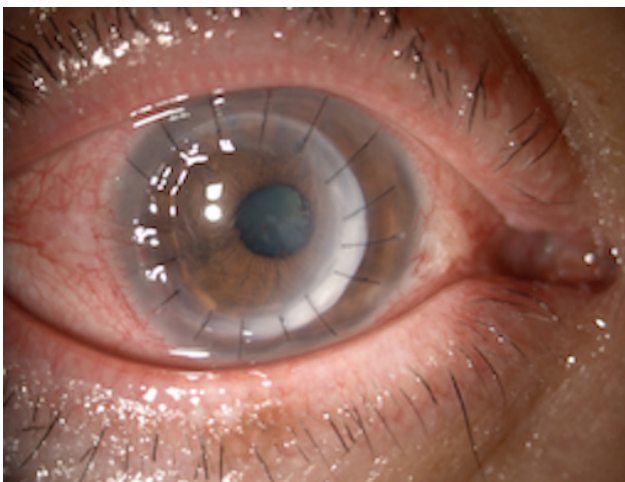


Figure 3 Post therapeutic keratoplasty (eccentric graft)

by modified acid-fast staining of the corneal button (Figure 2), and a few numbers of the organism were identified by Gomori methenamine silver (GMS) stain, confirming the diagnosis of microsporidial infection. After keratoplasty, she received topical moxifloxacin and topical steroid. The corneal graft was clear, no recurrence of infection and inflammation was noted

after six months follow-up, and her visual acuity was 20/100 compared to hand motion prior to surgery. (Figure 3)

Discussion

Ocular microsporidial infection has been mainly reported to occur in two distinctive clinical features: superficial keratoconjunctivitis and deep stromal keratitis, depending on patient's immune status. Superficial keratoconjunctivitis or epithelial keratitis is mostly seen in immunocompromised or AIDS patients.⁴ Patients may have disseminated microsporidiosis in other systems. However, this condition is increasingly reported in healthy individuals. This form is commonly associated with *Encephalitozoon* genus. Microsporidia were confined to the superficial epithelial cells of the conjunctiva or cornea, associated with an inflammatory infiltrate composed mostly of neutrophils and mononuclear cells. The inflammatory reaction

was generally mild or even absent. Stromal form is more common in immunocompetent individuals. It is associated with *Nosema* and *Vittaforma* genus. Microsporidia were found deep in the corneal stroma with spores contained within the phagocytic cells and lying freely between the fibrous layers of corneal lamellae, and a marked inflammatory reaction, including mononuclear, neutrophil, and epithelioid infiltration, was present.³ Sclerouveitis and endophthalmitis caused by microsporidia have also been reported in the literature.⁵⁻⁷

Microsporidia are commonly found in air, water, and soil. The risk factors of infection include immunocompromised status, topical corticosteroids use, wearing of contact lenses, history of trauma with dust and insect bites, soil or mud exposure, and animal exposure.⁸ Ocular infection could be caused by direct inoculation of transmission spores into the eye structures or by systemic propagation in immunocompromised patients with disseminated infection. As revealed in the patient's history, she stated that she works as a herder. She may have been exposed to microsporidia and microsporidial spores through contact with chickens in her farm, their body fluids, their infected waste, or their living environment.

The pathogenesis of microsporidial infection is not fully understood. The different host-parasite interactions may be observed depending on the microsporidial species and the competence of the immune response. In this case, the microsporidial infection should be acquired via environmental contamination through the cornea but the infection site might be deep in the corneal stroma or in the endothelial level that the corneal lesion could not be observed during the slit lamp examination. Confocal

microscopy may have a role in identifying the change.⁹ The reason why the iritis occurred instead of keratitis is not exactly known. The authors hypothesized that the inflammatory reaction in anterior chamber could be caused by a deep stromal infection which induced the inflammatory response in the anterior chamber before the cornea and topical steroid might defer the corneal infiltration. The iritis in this patient may be the early presentation or one of the entities of deep stromal infection, which microsporidia were found in the deep corneal stroma, and inflammation can occur without overlying epithelial defect. The other hypothesis is the coexistence of herpes simplex virus infection in microsporidial stromal keratitis.¹⁰

The large series of 124 patients with microsporidia keratitis in Singapore revealed the clinical features of the cases. Most of the cases are superficial keratoconjunctivitis. The pattern of keratitis was multiple, coarse, punctate epithelial lesions varying in number and location. They also reported the unusual findings, central corneal edema with KPs, and mild anterior uveitis in 26 cases, and limbitis in 3 eyes. These features occurred after initial monotherapy with topical fluoroquinolones, so the authors postulated that they are secondary immune-related endotheliitis after initiation of treatment.¹¹ Contrary to our case, the patient had anterior chamber reaction and KPs as the initial manifestations for many months before infiltration developed on the cornea.

Microsporidial keratitis can present with different clinical patterns. The previous description of two clinical features may no longer be accurate. The difference in clinical patterns may depend on microsporidial species beside host immune status. However, species identification was not investigated in this case because

of limited laboratory test facilities in our center.

Conclusion

Iritis could be the initial manifestation before stromal infiltration develops in microsporidial stromal keratitis, mimicking herpes etiology. The ophthalmologist should include the microsporidia in the differential diagnosis of keratouveitis. Diagnostic PCR and corneal biopsy should be performed in recalcitrant cases. Early surgical intervention should be considered.

Acknowledgement

We would like to extend our sincere gratitude to our pathologist, Dr. Julintorn Somran, for conducting micropathology.

Disclosure of interest

The authors report no conflicts of interest.

References

1. Han B, Weiss LM. Microsporidia: Obligate Intracellular Pathogens Within the Fungal Kingdom. *Microbiol Spectr*. 2016;5.
2. Didier ES. Microsporidiosis: an emerging and opportunistic infection in humans and animals. *Acta Trop*. 2005;94:61-76.
3. Weber R, Bryan R, Schwartz D, et al. Human microsporidial infections. *Clin Microbiol Rev*. 1994;7:426-61.
4. Robert W. Weisenthal, American Academy of Ophthalmology. Basic and Clinical Science Course Section 8, External disease and cornea. San Francisco: American Academy of Ophthalmology; 2019;280.
5. Mietz H, Franzen C, Hoppe T, et al. Microsporidia-induced sclerouveitis with retinal detachment. *Arch Ophthalmol*. 2002;120:864-5.
6. Yoken J, Forbes B, Maguire AM, et al. Microsporidial endophthalmitis in a patient with acute myelogenous leukemia. *Retina*. 2002;22:123-5.
7. Pariyakanok L, Satitpitakul V, Laksanaphuk P, et al. Stromal Keratitis with Endophthalmitis Caused by *Vittaforma Corneae* in an Immunocompetent Patient: A Case Report. *Ocul Immunol Inflamm*. 2019;27:826-8.
8. Sharma S, Das S, Joseph J, et al. Microsporidial keratitis: need for increased awareness. *Surv Ophthalmol*. 2011;56:1-22.
9. Hsiao YC, Tsai IL, Kuo CT, Yang TL. Diagnosis of microsporidial keratitis with in vivo confocal microscopy. *J Xray Sci Technol*. 2013;21:103-10.
10. Mittal R, Balne PK, Sahu S, et al. Coexistence of herpes simplex virus infection in microsporidial stromal keratitis associated with granulomatous inflammation. *Indian J Ophthalmol*. 2017;65:276-81.
11. Loh RS, Chan CM, Ti SE, et al. Emerging prevalence of microsporidial keratitis. *Ophthalmology*. 2009; 116:2348-53.

Bilateral Infectious Keratoconjunctivitis, A Way to Recognize Microsporidial Keratitis: A Case Report

รายงานผู้ป่วยกระจกตาติดเชื้อ Microsporidia ทั้งสองข้าง



Phantaraporn Tangtammaruk, MD¹
พันธราภรณ์ ตั้งธรรมรักษ์, พ.บ.



Varintorn Chuckpaiwong, MD¹
วรินทร์ จักรไพวงศ์, พ.บ.

Abstract

Purpose: To report a young immunocompetent patient who presented with bilateral microsporidial keratitis at Ramathibodi hospital, Thailand.

Design: A case report study.

Method: A case presentation with bilateral keratoconjunctivitis was recorded. History taking and ophthalmic examinations were noted. The patient was sent for anterior segment photography and corneal scraping was performed to confirm the diagnosis. Subsequent treatment with topical moxifloxacin followed by combination moxifloxacin and dexamethasone phosphate eye drops were prescribed. At every follow up visit the patient was re-evaluated by slit-lamp examination and anterior segment photography.

Result: We herein report a rare case of bilateral microsporidial keratitis in an HIV-negative young Thai male patient. He presented with keratoconjunctivitis in the right eye followed by the left eye after 4 days. Corneal scraping with gram-chromotrope staining identified microsporidial organisms. The patient was treated successfully with topical 0.5% moxifloxacin four times a day for 3 days followed by moxifloxacin dexamethasone phosphate four times a day for 1 week.

Conclusion: Microsporidial Keratitis can present as a bilateral disease in immunocompetent patient, although it is a quite rare presentation. It is characterized by red eyes and blurred vision with acute or subacute presentation. Slit-lamp findings typically shows multifocal bizarre shape subepithelial corneal infiltrations. Early recognition and proper treatments can result in good visual recovery.

Keywords: microsporidia, keratoconjunctivitis, moxifloxacin

Financial Support: None

Financial Disclosure: None

Address for correspondence: Phantaraporn Tangtammaruk, MD, Department of Ophthalmology, Ramathibodi Hospital, Mahidol University, Bangkok 10400, Thailand. Tel: (66)-2-201-2729. Fax: (66)-2-201-1516. E-mail: pp.phantaraporn@gmail.com

¹Department of Ophthalmology, Ramathibodi Hospital, Mahidol University, Bangkok, Thailand.

Introduction

Microsporidia is a spore-forming, obligate protozoa.¹ In 1990, Orenstein et al.² reported several cases of microsporidial keratoconjunctivitis associated with HIV infection. However, Chan et al.³ reported several cases of ocular microsporidial infection in HIV-negative patients in 2003. Furthermore, many studies have also reported microsporidial cases in immunocompetent patients with prolonged topical steroids, contact lens use, swimming in pools and post-operative laser-assisted in situ keratomileusis (LASIK) patients.⁴⁻⁶ Ocular microsporidiosis has two distinct clinical manifestations; deep corneal stromal infection in immunocompetent patients and chronic keratoconjunctivitis in patients with acquired immunodeficiency syndrome (AIDS).⁷ Bilateral microsporidial keratitis is a rare presentation and usually associated with HIV infection.⁸ One immunocompetent case with history of bathing in a local pond was reported by Curry et al.⁹ Microsporidia-related ocular symptoms are photophobia, foreign body sensation, and blurred

vision.¹⁰ There are many different treatment regimens including topical fumagillin, dibromopropamide isethionate, fluoroquinolone and systemic albendazole and itraconazole.

In Ramathibodi hospital, we reported a Thai male immunocompetent healthy patient with bilateral microsporidial keratoconjunctivitis.

Case Report

A 23-year-old Thai medical student with no underlying medical conditions complained of 3 days history of right ocular discomfort and redness. He had no systemic symptoms and had not been exposed to contaminated water. There was no history of trauma or previous ocular surgery. At the first visit, his best-corrected visual acuity (BCVA) was 20/50 in the right eye and 20/20 in the left eye. Slit-lamp examination showed mixed papillary and follicular conjunctivitis and superficial keratitis characterized by multiple diffuse subepithelial infiltration in bizarre shapes at central cornea in right eye and mild conjunctival

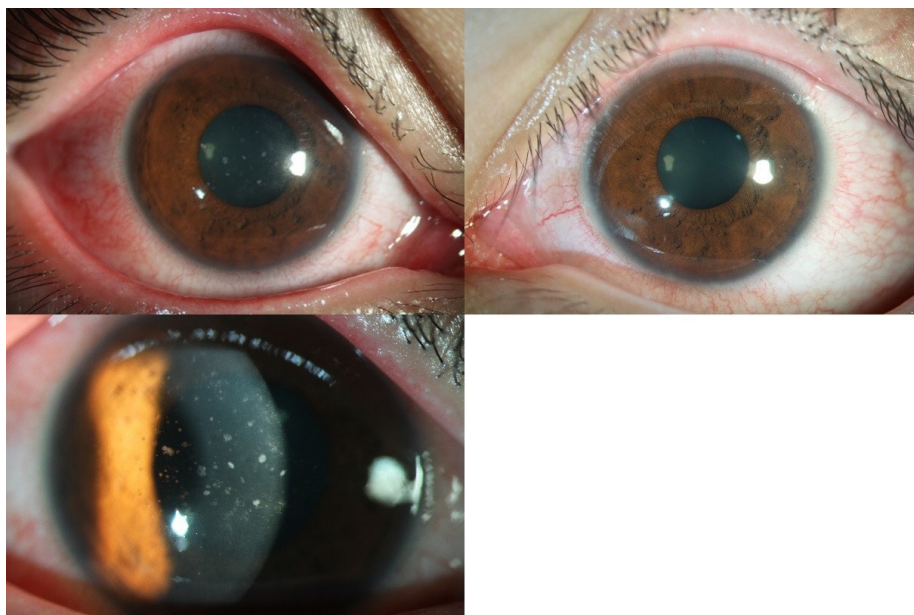


Figure 1 Cornea, right eye, showing subepithelial infiltrates in bizarre shape and left eye, showing mild redness without infiltration.

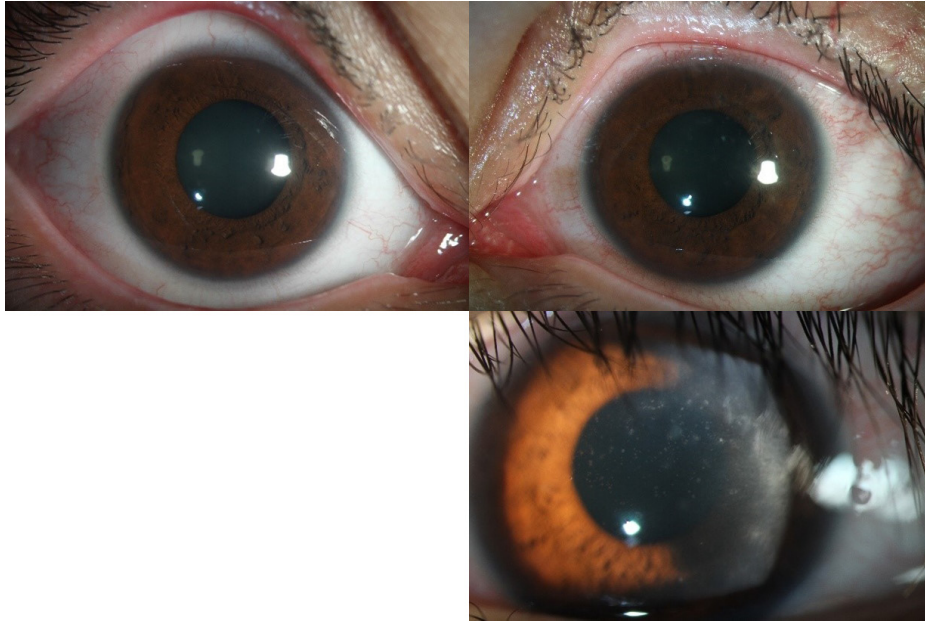


Figure 2 Cornea, right eye, showing fainting subepithelial infiltrates and left eye, showing new multiple elevated, round spots at a subepithelial level.

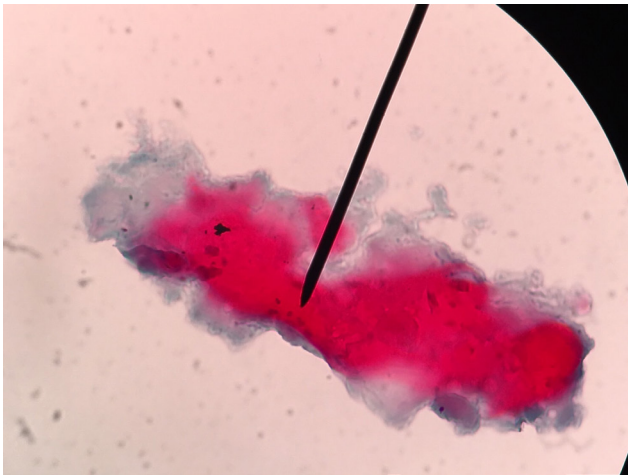


Figure 3 Gram-chromotrope, showing microsporidial organisms.

redness without corneal infiltration in left eye (Figure1). Anterior chamber examination was unremarkable in both eyes. A corneal scraping from right eye was performed with gram-chromotrope staining.

Initially, the patient was treated with 0.5% moxifloxacin four times daily on the right eye. After 3 day of treatment, the right eye showed significant improvement with the reduction of subepithelial

infiltrates. However, in the left eye he subsequently developed ocular pain and blurred vision and slit-lamp examination revealed similar multiple elevated and round subepithelial spots at the central cornea (Figure 2). At this point, the patient's BCVA was 20/40 in the right eye and 20/30 in the left eye. The gram-chromotrope stain from the right eye shown numerous microsporidial organisms (Figure3). He was subsequently switched to topical moxifloxacin dexamethasone phosphate in the right eye four times daily and 0.5% moxifloxacin four times daily was prescribed for the left eyes for 4 days and then switched to moxifloxacin dexamethasone phosphate for 1 week. After 2 weeks of treatments, the visual acuity for both eyes returned to 20/20 with complete resolution of all corneal infiltrations.

Discussion

Recently, the incidence of microsporidial keratoconjunctivitis has increased significantly in HIV-negative individuals in Asia.¹¹ The prevalence

of microsporidial keratoconjunctivitis was about 0.4-19.7%.^{12,13} Risk factors of microsporidial keratoconjunctivitis include contact lens usage, ocular surgery especially following LASIK or corneal transplantation, prolong usage of topical corticosteroid and history of bathing in thermal baths and exposure to contaminated water or soil.^{4-6,12} In Thailand, the incidence of microsporidial keratitis was highest during the rainy season from July to October.¹¹ Our case a rare presentation of bilateral microsporidial keratoconjunctivitis was observed in an otherwise healthy patient with no history of predisposing factors and without HIV infection or systemic immunosuppression.

Transmission electron microscopy is the definitive method of microsporidia identification. However, this technique is expensive, time consuming and required significant technical expertise. Various stains such as gram-chromotrope, potassium hydroxide plus calcofluor white, Gram, Giemsa, acid-fast, and modified Ziehl-Neelsen stains had all been used for the detection microsporidial organisms. The diagnosis of this case was made by clinical suspicious and the protozoa was identified with gram chromotrope staining.

Various treatment regimens had been used successfully for the treatment of microsporidial keratoconjunctivitis and topical fumagillin is the drug of choice for most cases.¹⁴ However, in Thailand, fumagillin is not readily available and topical fluoroquinolone has been used as the alternative treatment.¹⁴ In our case, topical moxifloxacin effectively treated microsporidial keratoconjunctivitis in both eyes. Sub-epithelial scars were found about 8-40% higher in the study without steroid treatment.^{5,10,11,14} After the infection subsided,

we switched to moxifloxacin dexamethasone phosphate and all the lesions were completely resolution without sub-epithelial scar.

We recommend that microsporidial keratoconjunctivitis should be considered in the differential diagnosis in patients who presented with atypical multifocal bizarre shapes diffuse superficial keratitis and corneal scraping should be performed with appropriate staining techniques. Ocular microsporidiosis is a treatable condition and early recognition and proper treatments may significantly improve clinical outcomes.

Conflict of Interest:

No conflicting relationship exists for any author

Acknowledgments

We thank Atasit Rojanasakul for editing a draft of this manuscript.

References

1. Bruce E, Silverstein BE, Cunningham Jr ET, et al. Microsporidial keratoconjunctivitis in a patient without human immunodeficiency virus infection. *Am J Ophthalmol* 1997;124:395-96.
2. Orenstein JM, Seedor J, Friedberg DN, et al. Microsporidian keratoconjunctivitis in patients with AIDS. *MMWR Morb Mortal Wkly Rep*. 1990;39:188-9.
3. Chan CM, Theng JT, Li L, et al. Microsporidial keratoconjunctivitis in healthy individuals: a case series. *Ophthalmology*. 2003;110(7):1420-5.
4. Theng J, Chan C, Ling ML, et al. Microsporidial keratoconjunctivitis in a healthy contact lens wearer without human immunodeficiency virus infection. *Ophthalmology*. 2001;108:976-8.
5. Rosberger DF, Serdarevic ON, Erlandson RA, et al. Successful treatment of microsporidial keratoconjunctivitis with topical fumagillin in a patient with

- AIDS. *Cornea*. 1993;12:261-5.
6. Moon SJ, Mann PM, Matoba AY. Microsporidial keratoconjunctivitis in a healthy patient with a history of LASIK surgery. *Cornea*. 2003;22:271-2.
 7. Weber R, Bryan RT, Schwartz DA, et al. Human microsporidial infections. *Clin Microbiol Rev*. 1994;7:426-61.
 8. Kersten A, Althaus C, Seitz HM, et al. Bilateral microsporidial keratitis in an HIV-positive patient with AIDS stage infection. *Klin Monbl Augenheilkd* 1998;212(6):476-9.
 9. Curry A, Mudhar HS, Dewan S, et al. A case of bilateral microsporidial keratitis from Bangladesh--infection by an insect parasite from the genus *Nosema*. *J Med Microbiol* 2007;56:1250-2.
 10. Martins SA, Muccioli C, Belfort R Jr, et al. Resolution of microsporidial keratoconjunctivitis in an AIDS patient treated with highly active antiretroviral therapy. *Am J Ophthalmol*. 2001;131:378-9.
 11. Thanathanee O, Athikulwongse R, Anutarapongpan O, et al. Clinical features, risk factors, and treatments of microsporidial epithelial keratitis. *Semin Ophthalmol* 31:266-70.
 12. Loh RS, Chan CML, Ti SE, et al. Emerging prevalence of microsporidial keratitis in Singapore: epidemiology, clinical features, and management. *Ophthalmology*. 116:2348-53.
 13. Joseph J, Sridhar MS, Murthy S, et al. Clinical and microbiological profile of microsporidial keratoconjunctivitis in southern India. *Ophthalmology*. 113:531-7.
 14. Tham AC, Sanjay S. Clinical spectrum of microsporidial keratoconjunctivitis. *Clin Exp Ophthalmol*. 40:512-8.

Herpes Zoster Ophthalmicus with Ophthalmoplegia: A Case Report and Review of Literature



SL Loh, WZ Ong, SL Ng

Abstract:

Herpes zoster ophthalmicus (HZO) is associated with a wide range of ocular complications from the anterior segment to the posterior segment, including neurological complications. Multiple cranial nerve palsies as a sequelae of HZO is less commonly seen. Here we reported a case of herpes zoster ophthalmicus with abducens nerve palsy and pupillary involvement in a young immunocompetent man. A 31-year-old man presented with right eye swelling, redness, blurring of vision for 3 days, associated with vesicles over the right sided forehead and periorbital region, with impaired gaze and diplopia. Diagnosis of right HZO with sixth nerve palsy and partial third nerve palsy was made. He was treated with a course of systemic antiviral therapy and steroids therapy. He had complete resolution of ophthalmoplegia after 3 months of treatment.

Keywords: Herpes zoster ophthalmicus, abducens nerve, ophthalmoplegia

Conflicts of interest:

The authors reported no conflicts of interest.

Address for correspondence: Department of Ophthalmology, Taiping Hospital, 34000 Taiping, Perak, Malaysia.

¹Department of Ophthalmology, Taiping Hospital, Malaysia

Introduction

Varicella-zoster virus (VZV) causes both chickenpox (varicella) and shingles (herpes zoster). Herpes zoster ophthalmicus (HZO) is the term used for shingles involving the dermatome supplied by the ophthalmic division of the trigeminal nerve. Approximately 10-20 percent of herpes zoster (HZ) infection are associated with HZO and 50 percent of HZO cases develop ocular complication.¹ It can cause wide range of ocular complications such as conjunctivitis, keratitis, uveitis, scleritis or episcleritis, acute retinal necrosis and optic neuropathy. Cranial nerve palsy occurs in less than 30 percent of HZO cases¹ and multiple cranial nerve palsies are even more uncommon. Here we reported a case of HZO with abducens nerve palsy and partial third nerve involvement.

Method

A case report. This study was approved by the Malaysian research ethic committee.

Results

A 31-year old man with no known medical illness, presented to ophthalmology clinic with complaints of right eye swelling, redness, blurring of vision for 3 days. It was associated with vesicles over the right sided forehead and periorbital region.

On examination, there was multiple vesicles over his right sided forehead, periorbital region, nasal bridge and tip of the nose. His right eye was swollen, tense and unable to open spontaneously. His eye lashes were crusted with discharge. His visual acuity was 6/60 in the right eye and 6/9 in the left eye. His right pupil was mid-dilated and non-reactive to light and near object, but

the reversed RAPD (relative afferent pupillary defect) was negative. There was right ophthalmoplegia where he had restriction in right eye abduction. No ptosis was noted. On examination of his right eye, the conjunctiva was injected with mild chemosis, the corneal surface was dry with presence of generalized punctate epithelial erosion. Otherwise, the anterior chamber was deep with no anterior chamber reaction. Intraocular pressure was normal. His dilated funduscopy was unremarkable. Examination of the fellow eye was normal.

An urgent computed tomography (CT) scan of orbit and brain with contrast was done and excluded orbital cellulitis and abscess collection. Neither did the CT scan show any abnormalities in the orbital apex nor cavernous sinus region. A diagnosis of right herpes zoster ophthalmicus with abducens nerve and pupillary involvement was made. He was admitted for a course of intravenous Amoxicillin/clavulanic acid 1.2 g three times per day for his preseptal cellulitis, as well as treated with oral acyclovir 800mg 5 times per day, topical levofloxacin 0.5% eye drops four times per day, and topical dexamethasone 0.1% eye drops four times per day.

After one week of treatment, the vesicles dried up and there was scab formation over his nasal bridge. His right pupil was still mid-dilated and non-reactive to light and near; reversed RAPD was negative. His color vision test with Ishihara plate was normal bilaterally and there was no red desaturation. Confrontation test was grossly normal. His right eye ophthalmoplegia persisted. (Figure 1) His right eye vision was 6/60, PH 6/24 and left eye 6/9. It was complicated with filamentary keratitis with mild anterior uveitis. There was no posterior synechiae formation. Dilated funduscopy was otherwise normal. Oral prednisolone



Figure 1 Ocular motility show right eye abduction deficit.



Figure 2 Complete resolution of ophthalmoplegia after 3 months of follow up.

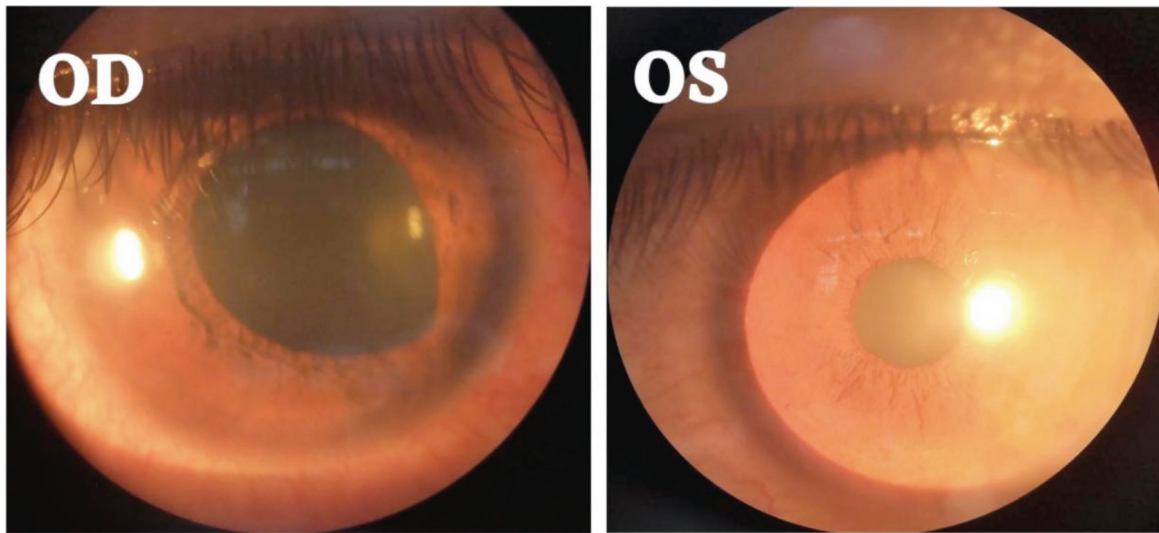


Figure 3 The right paralytic mydriasis persisted 3 months. There was no posterior synechiae formation.

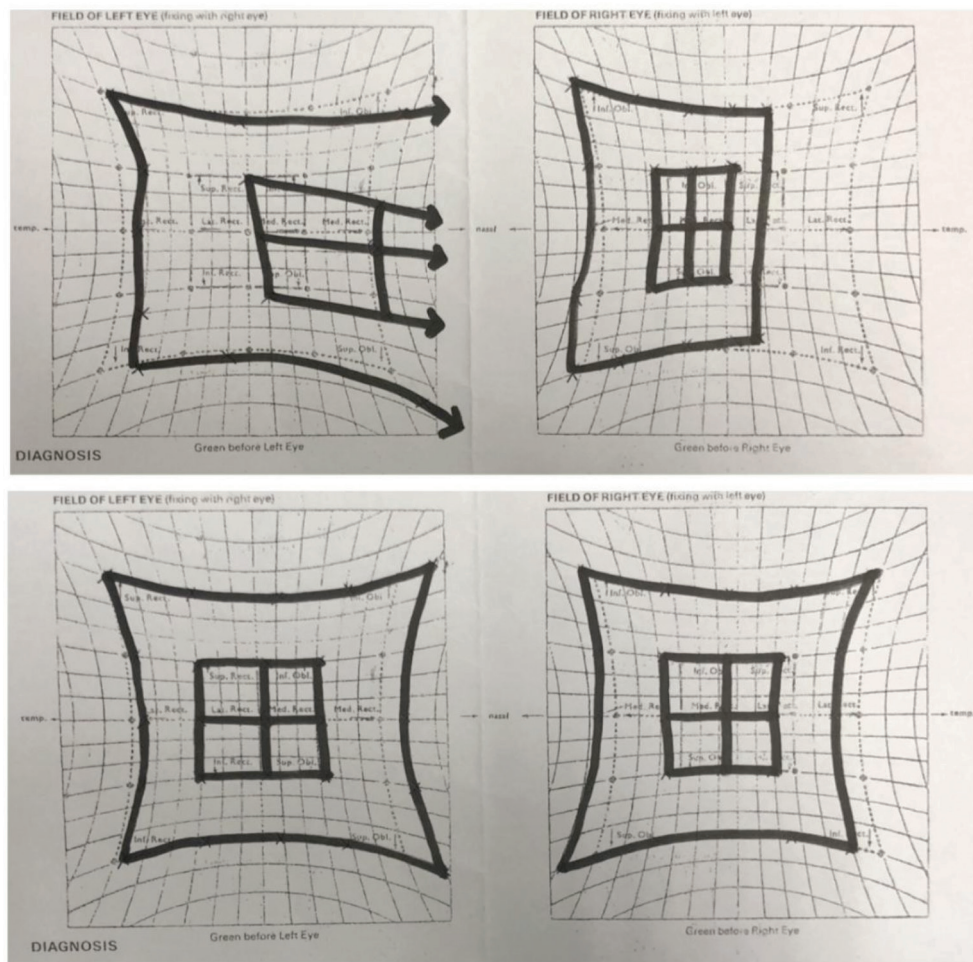


Figure 4 (Top) Hess showed right lateral rectus under-action. (Bottom) Hess chart during 3 month follow up showed resolution of right lateral rectus.

50 mg OD (0.5 mg/kg) was initiated and ointment acyclovir 5 times per day was added, while oral Acyclovir was maintained. However, he developed acyclovir induced hepatitis after three weeks of treatment, which resolved after the Oral Acyclovir was tapered to 400 mg 5 times per day.

He had complete resolution of ophthalmoplegia after 3 months of treatment with tapering dose of oral prednisolone and oral Acyclovir (Figure 2). On his latest review, his BCVA was 6/9 bilaterally. There was no sign of aberrant regeneration of pupillary function. His right eye paralytic mydriasis remained persistent and non-reactive to both light and near attempt, but he no longer experienced diplopia. (Figure 3) However the patient had defaulted our subsequent follow up due to COVID-19 pandemic.

Discussion

Herpes zoster ophthalmicus occurs following reactivation of latent varicella zoster virus in the ophthalmic division of trigeminal sensory ganglion. The lifetime risk of developing HZ is estimated to be 25% and for those over 85 years, the risk is increased up to 50%.² HZO is less common in young immunocompetent patients, and they tend to have more localized and milder forms of presentation as well as more responsive to treatment.³ A retrospective series by Chan AY et al. found that there was association of young age HZO with immunosuppression and smoking habits.⁴ The presentation in our case was rather uncommon, as our patient was young, non-smoker and immunocompetent, yet he presented with severe HZO with cranial nerve palsy. Most patients with HZO usually presented with prodromal syndromes such as fever, malaise and headache, before developing

acute skin eruption which evolves through erythema, macules, papules, vesicles, pustulation and crusting, lasting from days to weeks.⁵ Hutchinson's sign, which is positive in our case, is evident by presence of lesions in the tip of nose. This sign is suggestive of nasociliary nerve involvement and is associated with higher risk of ocular complications.¹

During acute stage of HZO, patients may develop periorbital edema and mechanical ptosis, and as the inflammation subsides, there may be residual ptosis or cicatricial changes to the eyelid, causing entropion or ectropion.⁵ Other than the skin lesions, HZO can also lead to multiple complications in the anterior segments, such as episcleritis, scleritis, punctate epithelial keratitis, numular keratitis, disciform keratitis, neurotrophic keratopathy, exposure keratopathy, and keratouveitis. Posterior segment complications are less commonly seen but can be sight threatening, they include retinal perivasculitis, ischemic optic neuritis, and acute retinal necrosis.

Ocular motility palsy with diplopia occurs occasionally following acute HZO, usually 1 to 3 weeks after the skin eruption.⁶ There are multiple presentation of cranial nerve palsies in HZO. It can occur in isolation or multiple cranial nerves simultaneously; ipsilateral, contralateral or bilateral.⁷ The most common cranial nerve involved is oculomotor nerve, followed by trochlear nerve and abducens nerve. Multiple cranial nerves involvement are rare and complete ophthalmoplegia is even rarer.⁶ There is a significant association between ophthalmoplegia and severity of HZO, neuralgia, iritis and iris atrophy.⁷

In our case, abducens nerve palsy occurs within a week after onset of zoster rash, and recovered in 12 weeks' time with treatment. The case report by Shin

et al.⁸ and Gupta et al.⁹ had a similar presentation. In both cases, the onset abducens nerve palsy are also within a week following the eruption of the rash. The first case recovered completely in 7 weeks while the later recovered in 8 weeks.^{8,9} The pathogenesis of cranial nerve palsies in HZO is unclear and can be multi-factorial. One of the postulation is that the palsies may be due to the extension of inflammation from the trigeminal nerve to the other cranial nerves through cavernous sinus.⁹ Other postulations include direct viral neuropathic damage and immune mediated reaction, which causes perineuritis, demyelination, compression by orbital inflammation, ischemia secondary to occlusive vasculitis and myositis.^{10,11}

In our case, our patient also presented with pupillary paralysis other than abducens nerve palsy. In HZO, concurrent pupillary paralysis has been reported in minority of cases. Pupillary paralysis may be associated with some degree of ophthalmoplegia or with any of the isolated cranial nerve palsy.¹² On the other hand, isolated pupillary paralysis in HZO is an extremely rare finding.¹³ The mechanism of it is unclear and it can be attributed to partial third nerve palsy, whereby there is involvement of the pupillary fibers for light and accommodation-convergence but not the motor fibers.¹²

Another rare differential diagnosis to be considered is internal ophthalmoplegia, which is a condition associated with parasympathetic denervation of the sphincter pupillae muscle of the iris. Internal ophthalmoplegia affects the pupillary function without affecting the extraocular muscle motility.¹⁴

As a general rule, any onset of an ophthalmoplegia with pupillary involvement does warrant an urgent imaging test to exclude potentially life-threatening

conditions such as aneurysm or space occupying lesion. CT scan is commonly used as the first line neuroimaging test, as it is more widely available and can be done more rapidly than magnetic resonance imaging (MRI) scan. On the contrary, MRI has longer scan times thus more time consuming, and may not be readily available in after-hours settings. However its superior soft-tissue resolution makes it the examination of choice in many neuro-ophthalmic conditions.¹⁵ In our case, an urgent CT scan with contrast was carried out to rule out orbital cellulitis or subperiosteal abscess. In cases of third nerve palsy, the decision whether to proceed with CT angiography would depends on the severity of external ophthalmoplegia (external dysfunction) and pupillary involvement (internal dysfunction).¹⁵ In our case, there was complete internal dysfunction but no external dysfunction of the oculomotor nerve, therefore it is unlikely due to aneurysm and no CTA was done. MRI was not done subsequently as the sixth nerve palsy had resolved after the treatment.

Some literature reported that the cranial nerve palsy in HZO may resolve spontaneously after several weeks to months, even without specific treatment.^{6,8} Nevertheless, there are also studies which showed that early treatment and adequate dosing of antiviral is associated with better prognosis. Studies have shown that oral Acyclovir 800 mg 5 times a day for at least a week, started within 72 hours after onset of rashes, has lower rate of severe ocular complications (4%), as compared to patients with inadequate treatment (25%) or no treatment group (21%).¹⁶ Oral Acyclovir can shorten the duration of rash and pain, while reducing the duration of viral shedding and vesicle formation. There is also reduction in the incidence of either early and late onset ocular complications or inflammation

with optimal antiviral therapy.¹⁶

Systemic corticosteroids therapy in treatment of herpes zoster has been a controversial issue in the past, but in the era of antivirals, it has now become less controversial. In fact, studies has shown that concomitant antiviral therapy and oral corticosteroids in immunocompetent patients has significantly hasten the recovery process in terms of rash and acute pain, thus improve quality of life.^{16,17} Corticosteroids can also be considered for patients with severe rash, or cranial nerve palsies to improve motor outcomes, provided there is no contraindications.¹⁶ In our case, the patient was treated promptly with both oral Acyclovir and prednisolone as the potential benefits outweighed the risks. He had complete resolution of ophthalmoplegia and achieve good vision after 3 months of treatment, despite persistent pupillary paralysis.

Conclusion

In conclusion, HZO does occur in young immunocompetent patients. Early diagnosis and prompt treatment of the condition is very crucial to give a better outcome to the patient. Combination of both oral antiviral and corticosteroids does play the role in preventing further ocular complications. With adequate treatment, the prognosis for recovery from HZO related cranial nerve palsy is good.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and

due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

Acknowledgement

The authors would like to thank the Director of Health Malaysia for permission to publish this paper.

References

1. Kedar S, Jayagopal LN, Berger JR. Neurological and ophthalmological manifestations of varicella zoster virus. *J Neuro-Ophthalmol* 2019 Jun 1;39(2):220-31.
2. Johnson RW. Herpes zoster and postherpetic neuralgia. *Expert Rev Vaccines*. 2010 Mar 1;9(sup3):21-6.
3. Gupta N, Sachdev R, Sinha R, Titiyal JS, Tandon R. Herpes zoster ophthalmicus: disease spectrum in young adults. *Middle East Afr J Ophthalmol*. 2011;18(2):178–82
4. Chan AY, Conrady CD, Ding K, Dvorak JD, Stone DU. Factors associated with age of onset of herpes zoster ophthalmicus. *Cornea*. 2015 May 1;34(5):535-40.
5. Liesegang TJ. Herpes zoster ophthalmicus: natural history, risk factors, clinical presentation, and morbidity. *Ophthalmology*. 2008 Feb 1;115(2):S3-12.
6. Horton JC. Neurovisual manifestations of herpes viruses. *Int Ophthalmol Clin*. 2002 Jan 1;42(1):33-41.
7. Marsh RJ, Dullely B, Kelly V. External ocular motor palsies in ophthalmic zoster: a review. *Br J Ophthalmol* 1977 Nov 1;61(11):677-82.
8. Shin MK, Choi CP, Lee MH. A case of herpes zoster with abducens palsy. *J Korean Med Sci*. 2007 Oct 1; 22(5):905-7.
9. Gupta R, Lata H, Narang S, Sood S. Herpes Zoster Ophthalmicus with Abducens Palsy. *Asian J Ophthalmol*. 2003;5(2).

10. Sanjay S, Chan EW, Gopal L, Hegde SR, Chang BC. Complete unilateral ophthalmoplegia in herpes zoster ophthalmicus. *J Neuro-ophthalmol*. 2009 Dec 1;29(4):325-37.
11. Ruiz-Arranz C, Reche-Sainz JA, de Uña-Iglesias MC, Ortueta-Olartecoechea A, Muñoz-Gallego A, Ferro-Osuna M. Orbital apex syndrome secondary to herpes zoster ophthalmicus. *Arch de la Sociedad Española de Oftalmología (English Edition)*. 2020 Aug 27.
12. Czyz CN, Bacon TS, Petrie TP, Justice JD, Cahill KV. Isolated, complete paralytic mydriasis secondary to herpes zoster ophthalmicus. *Pract Neurol*. 2013 Jun 1;13(3):183-4.
13. Casal IA, Monteiro S, Borges T, Vale C, Friande A, Araújo M, et al. Herpes Zoster Ophthalmicus with Isolated Paralytic Mydriasis. *Ann Clin Case Rep*. 2016; 1(1):1082.
14. Top Karti D, Aktert D, Celebisoy N. Isolated internal ophthalmoplegia secondary to herpes zoster ophthalmicus: A rare case report. *Neuro-Ophthalmology*. 2020 Mar 3;44(2):118-20.
15. Lee AG, Johnson MC, Policeni BA, Smoker WR. Imaging for neuro-ophthalmic and orbital disease—a review. *Clin Exp Ophthalmol*. 2009 Jan;37(1):30-53.
16. Pavan-Langston D. Herpes zoster: antivirals and pain management. *Ophthalmology*. 2008 Feb 1;115(2):S13-20.
17. Tsau PW, Liao MF, Hsu JL, Hsu HC, Peng CH, Lin YC, et al. Clinical presentations and outcome studies of cranial nerve involvement in herpes zoster infection: a retrospective single-center analysis. *J Clin Med*. 2020 Apr;9(4):946.

เรื่อง An Unusual Presentation of Microsporidial Keratitis as Iritis without Corneal Lesion: A Case Report

หน้า 21

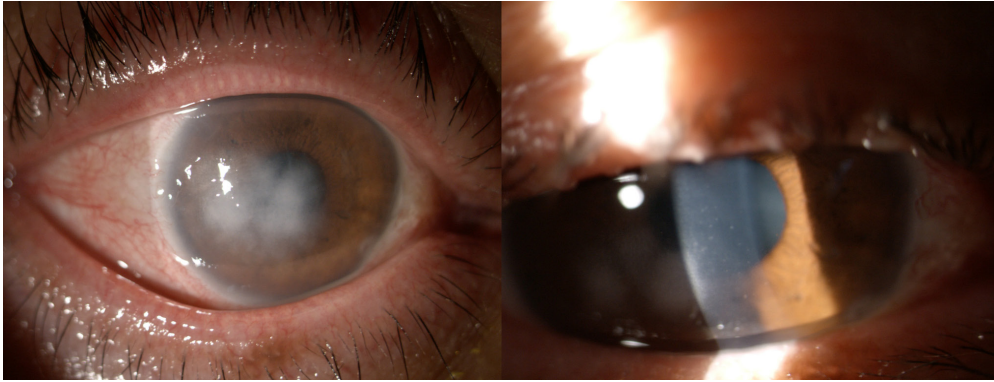


Figure 1 Deep stromal infiltration developed after iritis.

หน้า 22

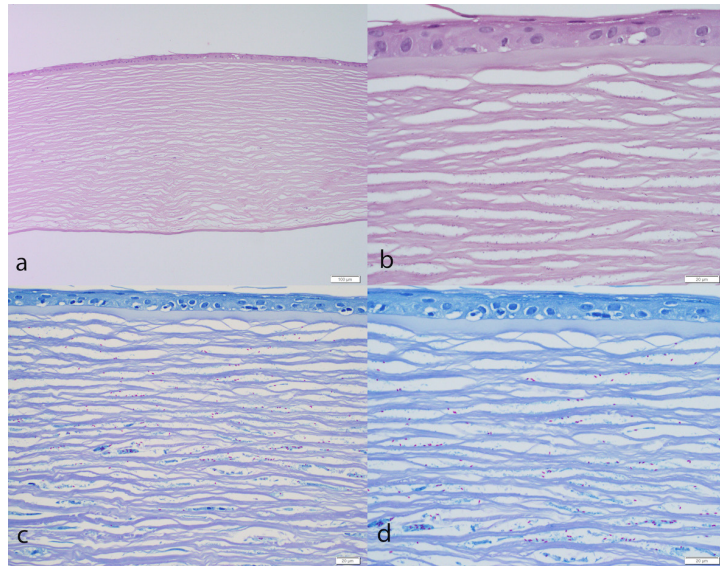


Figure 2 H&E and modified AFB staining showed oval bodies in corneal stroma; a) H&E 100X; b) H&E 600X; c) mAFB 400X; d) mAFB 600X

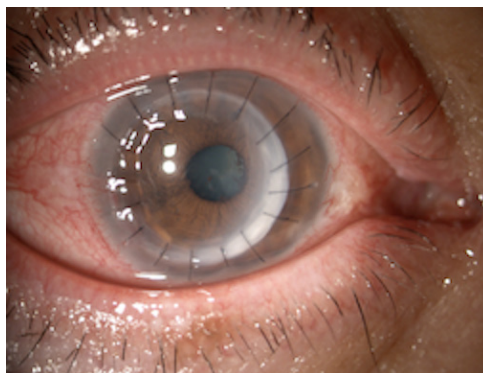


Figure 3 Post therapeutic keratoplasty (eccentric graft)

เรื่อง Bilateral Infectious Keratoconjunctivitis, A Way to Recognize Microsporidial Keratitis: A Case Report

หน้า 26

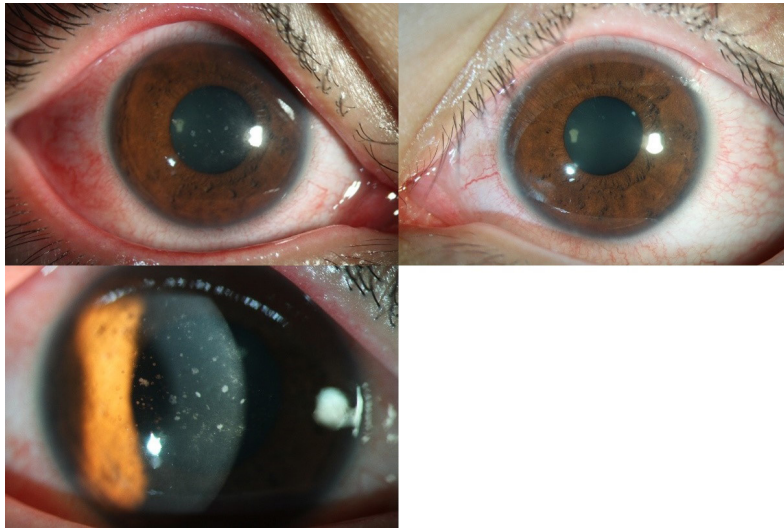


Figure 1 Cornea, right eye, showing subepithelial infiltrates in bizarre shape and left eye, showing mild redness without infiltration.

หน้า 27

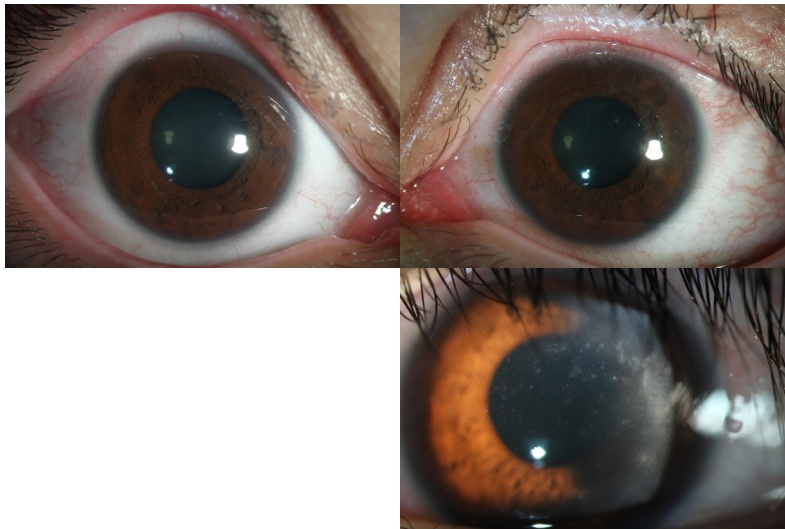


Figure 2 Cornea, right eye, showing fainting subepithelial infiltrates and left eye, showing new multiple elevated, round spots at a supepithelial level.

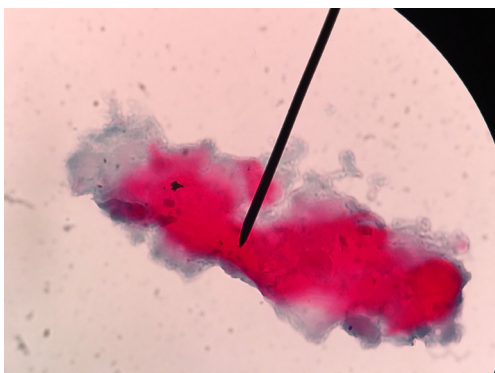


Figure 3 Gram-chromotrope, showing microsporidial organisms.

เรื่อง Herpes Zoster Ophthalmicus with Ophthalmoplegia: A Case Report and Review of Literature

หน้า 32



Figure 1 Ocular motility show right eye abduction deficit.



Figure 2 Complete resolution of ophthalmoplegia after 3 months of follow up.

หน้า 33

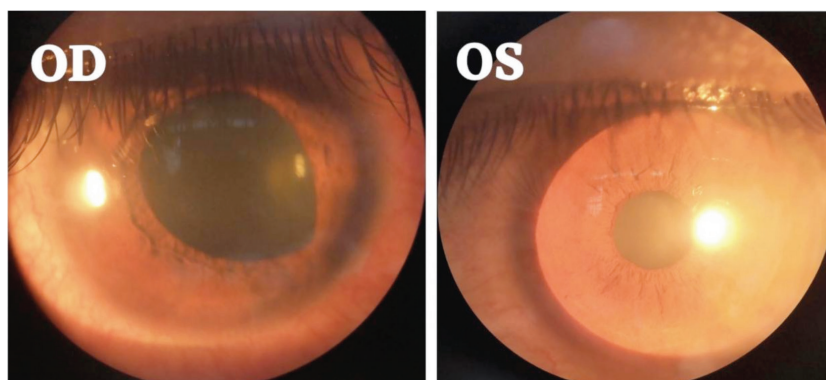


Figure 3 The right paralytic mydriasis persisted 3 months. There was no posterior synechiae formation.