PERSPECTIVE

Preventive measures for lacrimal procedures during the outbreak of COVID-19: perspective

Shing-Chuen Chow[1], Wang-Ngai Ha[1], Pun-Yuet Lam[1], Loraine LW Chow[1,2]
[1]The Li Ka Shing Faculty of Medicine, The University of Hong Kong, Hong Kong
[2]Queen Mary Hospital & Grantham Hospital, Hong Kong

Correspondence and reprint requests:
LLW Chow, Department of Ophthalmology, The University of Hong Kong. Email: llwchow@hku.hk

Abstract

Aerosols are a major route of transmission of COVID-19. Lacrimal procedures such as lacrimal irrigation, manipulation, and surgery involve aerosols. We searched the PubMed database for articles related to preventive measures of lacrimal procedures during the COVID-19 pandemic. Seven relevant articles were reviewed. Preoperative measures include patient screening, triage, and use of personal protective equipment. Intraoperative measures include procedure-specific aerosol reduction, use of povidone-iodine as disinfectant, and use of personal protective equipment. Postoperative measures include use of telemedicine for follow-up. Elective lacrimal procedures were suspended periodically and resumed when the outbreak subsided, with strict implementation of guidelines. The preventive measures may be effective in lowering the risk of transmission from patients potentially positive with COVID-19.

Key words: Aerosols; COVID-19; Dacryocystorhinostomy; Lacrimal apparatus diseases; Nasolacrimal duct

Background

The Severe Acute Respiratory Syndrome Coronavirus 2 can cause pneumonia and multiorgan disease. Common symptoms include fever, cough, and myalgia. The transmission routes of COVID-19 include direct transmission (via contact of oral, nasal, and ocular mucosa with infected respiratory droplets after coughing and sneezing), airborne transmission (via aerosols during aerosol-generating procedures), and feco-oral transmission (via viral shedding in feces and urine).[1-3] Aerosols are small respirable particles of <5-10 μm that can remain airborne for short- and long-range transport.[4,5] The virus can survive up to 3 hours in aerosols.[6] Patients with COVID-19 may present with ocular symptoms, and shedding of the virus in tears can be detected by reverse transcription polymerase chain reaction.[7-9]

Lacrimal irrigation, manipulation, and surgery involve aerosols.[10] Dacryocystorhinostomy involves manipulation of nasal tissue and lacrimal apparatus, general anesthesia during airway management, and use of ultrasonic aspirators, bone drills, and cautery.[11-14] Preventive measures should be implemented to reduce the risk of transmission. We aim to review the current preventive measures for lacrimal procedures during the COVID-19 pandemic and share our experience in the Department of Ophthalmology of Hong Kong West Cluster.

Methods

The PubMed database was searched on 4 February 2021 using keywords: 'lacrimal surgery', 'lacrimal procedures', 'dacryocystorhinostomy', 'nasolacrimal duct surgery', 'aerosol', and 'COVID-19'. 15 articles were identified and curated for preventive measures of lacrimal procedures during the COVID-19 pandemic. Seven of them were relevant.[15-21] Practices to reduce the spread of the coronavirus during lacrimal surgery include patient screening,[15,18-20] triage and prioritization according to the urgency,[15,17,19-21]

the use of personal protective equipment (PPE),[15,19-21] preventive measures to reduce aerosol generation during lacrimal procedures,[15,17,20,21] the use of povidone-iodine as a disinfectant,[15,16,18] and the use of telemedicine in follow-up.[18-20]

Patient screening

Patients should be screened for the presence of fever, symptoms suggestive of respiratory tract infection, acute conjunctivitis, and diarrhea.[15,18-20] Their travel history, occupation, contact history with suspected or confirmed COVID-19 cases, and personal address should also be recorded.[15,18-20] Those who failed the screening should be isolated, consulted by a doctor, and tested for COVID-19.[20] Patients who need to undergo high-risk procedures (such as endoscopic, endonasal dacryocystorhinostomy) should take serological (immunoglobulins M and G) and reverse transcription polymerase chain reaction tests[17,19,21] and chest radiography[21] before the operation.

Triage and prioritization

Elective high-risk lacrimal procedures should be avoided during the outbreak of COVID-19.[15,17,19-21] According to the Royal Australian and New Zealand College of Ophthalmologists guideline, high infection risk procedures (such as surgery involving upper aerodigestive tract, nasal syringing, sinonasal surgery, and nasal endoscopy) should not be performed unless indicated.[20] Patients requiring nasal or dacryoendoscopy should be triaged to three categories: emergency (congenital dacryocystocele, postsurgical epistaxis, pediatric acute dacryocystitis, acute nasolacrimal duct trauma and suspected recurrence of previous lacrimal drainage malignancy), urgency (recurrent hemolacria, inflammatory secondary acquired lacrimal drainage obstruction, suspected lacrimal drainage mass and stent extubation in presence of complications), and elective (routine primary acquired nasolacrimal duct obstruction, congenital nasolacrimal duct obstruction, uncomplicated stent extubation).[15] Ophthalmologists can decide on the necessity of the procedure and whether it should be postponed or performed early.[17] Emergent lacrimal procedure should be performed regardless of the COVID-19 status of the patient.[15] Those suspected to have COVID-19 and require semi-urgent procedures should be isolated, and the decision on the lacrimal procedure should be made after testing of COVID-19. For patients without any symptoms but have problems answering the questionnaire, infectious disease specialist should be consulted, and COVID -19 test should be performed before the surgery.[15]

Personal protective equipment

Ophthalmologists should use PPE (mask, gloves, glasses, and gowns).[19,20] Protective masks should be worn constantly and changed every 4 hours.[19] The slit lamp should be mounted with a plastic shield.[19,20] There are two PPE variants for lacrimal surgeries: enhanced PPE and full PPE.[15] The enhanced PPE include regular scrubs, full sleeve surgical gown, surgical head cap, N-95/FFP3 respirator, goggles, double surgical gloves, and boot cover, whereas the full PPE include disposable scrubs, double surgical gloves, full sleeve surgical gown with hairnet and hood cover, boot cover, N-95/FFP3 respirator, goggles, and face shield. All India Ophthalmological Society – Oculoplastics Association of India suggest two types of PPE: type A (ideal PPE) and type B (minimum PPE).[21] Ideal PPE include hazmat suit, N95, shoe cover, and visor, whereas minimum PPE include surgical gown, N95, visor, and shoe cover, with or without cap, plastic apron, and goggles.

Povidone-iodine as disinfectant

Povidone-iodine can be used as disinfectant in various forms:[15,16,18] eyedrops (1% to 5% concentration), gargles (1%), and throat spray (0.45%).[16] For lacrimal surgeries, a preoperative protocol is suggested: using 1% povidone-iodine gargles, placing 1% povidone-iodine in conjunctival cul-de-sac, irrigating the lacrimal drainage system with 0.4% povidone-iodine, and placing 0.4% povidone-iodine in the anterior nasal cannula.[16]

Reducing aerosol generation and transmission

Methods to reduce aerosol generation and transmission during lacrimal surgeries are suggested.[15,17,20,21]

Intraoperative measures

For lacrimal irrigation, All India Ophthalmological Society – Oculoplastics Association of India suggest that all staff should wear minimum PPE and use low capacity 1-cc syringe and 25- or 27-G straight cannulas. Using a probe to assess obstruction should be avoided.[15]

For nasal and dacryoendoscopy, all surfaces of endoscopy-procedure room should be cleaned systemically.[17] The number of staff should be minimized, and staff should wear PPE. The procedure should be quick and under control. To keep a distance from the patient, magnifiers or loupes should be used. Direct viewing through eyepiece of endoscopy should be substituted by using a monitor. After the procedure, instruments should be sterilized, and contaminated disposables should be disposed. The use of atomizers and suction should be avoided, as should routine nasal endoscopy.[15]

Elective dacryocystorhinostomy should not be performed,[15,21] because drills and debriders increase the chance of aerosol generation when removing bone within nasal cavity.[21] During endoscopic dacryocystorhinostomy, all staff in the operation theater should wear PPE.[21] External route is preferred when an urgent dacryocystorhinostomy is needed.[15] Powered instruments such as cautery, drills, ultrasonic aspirators, and suction should not be used.[15,21] Incisional blades should be used instead.[15] Direct decongestion on nasal mucosa is needed before incision to prevent the requirement of suction.[15]

Local anesthesia is preferred to general anesthesia.[20,21] Intubation in general anesthesia may generate aerosols and expose anesthesiologists to patients' respiratory secretions.[20,21] Only anesthetic staff should be present

during intubation.[20] Fentanyl or alfentanil should be used for sedation to avoid sneezing reflex during periocular anesthetic injection.[20]

For stent extubation, endoscopic removal is the quickest way, but external approach can also be used.[15] The sneezing maneuver is not recommended during the external approach.[15] When the sneezing maneuver is required, patient should be instructed to blow their nose away from others after the stent is divided between the puncta.[20] Bicanalicular stents can be removed through the conjunctival aspect.[20]

Telemedicine

Telemedicine may be used by oculoplastic surgeons during follow-ups.[18-20] Telephone encounters, video visits, meeting platforms, and telemedicine-enabled slit lamps can be used.[18] To facilitate telemedicine in follow-up, dissolvable skin sutures should be used.[20] However, telemedicine cannot be used in patients without internet connection and when physical examination is required.[20] Quarantined physicians can take up the role of telemedicine to reduce the workload of practicing physicians.[18]

Discussion

In Hong Kong West Cluster, elective lacrimal procedures were suspended periodically and resumed when the outbreak subsided, with strict implementation of guidelines. There has been no COVID-19 case secondary to lacrimal procedures.

To reduce the risk of COVID-19 transmission, the Hong Kong West Cluster implement several preventive measures. Surgical masks and gloves are used during probing and irrigation. Patients for endoscopic procedure and/or dacryocystorhinostomy must obtain negative COVID-19 test results before dacryoendoscopic assessment of the nasal anatomy. Ophthalmologists are equipped with full personal protective equipment (gloves, gowns, face shields) and N95 respirators, as endoscopy is considered an aerosol-generating procedure. Another COVID-19 test is required before dacryocystorhinostomy, which is performed under general anesthesia. N95 respirators and surgical gowns are used during the operation. All medical personnel involved are required the same protective standard. Minimal medical personnel are allowed in the operation theater. Bicanalicular stent is used. Strict restrictions are applied during nasoendoscopic procedures for clot removal, checking of the osteotomy site, ensuring the postoperative patency of the drainage tract, and stent removal. Both stent and clot were removed via the nasal route with the nasoendoscope.

Conclusion

Various pre-, intra-, and post-operative preventive measures may help reduce the risk of transmission of COVID-19. In Hong Kong West Cluster, there has been no COVID-19 case secondary to lacrimal procedures.

Contributors

All authors designed the study, acquired the data, analysed the data, drafted the manuscript, and critically revised the manuscript for important intellectual content. All authors had full access to the data, contributed to the study, approved the final version for publication, and take responsibility for its accuracy and integrity.

Conflicts of interest

All authors have disclosed no conflicts of interest.

Funding/support

This study received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Data Availability

All data generated or analysed during the present study are available from the corresponding author on reasonable request.

References

1. *Fathizadeh H, Maroufi P, Momen-Heravi M, et al. Protection and disinfection policies against SARS-CoV-2 (COVID-19). Infez Med 2020;28:185-91.*
2. *Anderson EL, Turnham P, Griffin JR, Clarke CC. Consideration of the Aerosol Transmission for COVID-19 and Public Health. Risk Anal 2020;40:902-7.* Crossref
3. *Umakanthan S, Sahu P, Ranade AV, Bukelo MM, Rao JS, Abrahao-Machado LF, et al. Origin, transmission, diagnosis and management of coronavirus disease 2019 (COVID-19). Postgrad Med J 2020;96:753-8.*
4. *Prevention UCfDCa. Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings. 2007.*
5. *Organization WH. Infection prevention and control of epidemic-and pandemic prone acute respiratory infections in health care 2014*
6. *van Doremalen N, Bushmaker T, Morris DH, Holbrook MG, Gamble A, Williamson BN, et al. Aerosol and Surface Stability of SARS-CoV-2 as Compared with SARS-CoV-1. N Engl J Med 2020;382:1564-7.* Crossref
7. *Dockery DM, Rowe SG, Murphy MA, Krzystolik MG. The Ocular Manifestations and Transmission of COVID-19: Recommendations for Prevention. J Emerg Med 2020;59:137-40.* Crossref
8. *Wu P, Duan F, Luo C, Liu Q, Qu X, Liang L, et al. Characteristics of Ocular Findings of Patients With Coronavirus Disease 2019 (COVID-19) in Hubei Province, China. JAMA Ophthalmol 2020;138:575-8.* Crossref

9. *Chen L, Liu M, Zhang Z, et al. Ocular manifestations of a hospitalised patient with confirmed 2019 novel coronavirus disease. Br J Ophthalmol 2020;104:748-51.* Crossref
10. *Canadian Society of Oculoplastic Surgery COS. Lacrimal irrigation/Surgery/Manipulation During the COVID-19 Pandemic 2020*
11. *Thiruvenkatarajan V, Wong DT, Kothandan H, et al. Airway Management in the Operating Room and Interventional Suites in Known or Suspected COVID-19 Adult Patients: A Practical Review. Anesth Analg 2020;131:677-89.* Crossref
12. *Alp E, Bijl D, Bleichrodt RP, Hansson B, Voss A. Surgical smoke and infection control. J Hosp Infect 2006;62:1-5.* Crossref
13. *Jewett DL, Heinsohn P, Bennett C, Rosen A, Neuilly C. Blood-containing aerosols generated by surgical techniques: a possible infectious hazard. Am Ind Hyg Assoc J 1992;53:228-31.* Crossref
14. *Mick P, Murphy R. Aerosol-generating otolaryngology procedures and the need for enhanced PPE during the COVID-19 pandemic: a literature review. J Otolaryngol Head Neck Surg 2020;49:29.* Crossref
15. *Ali MJ, Hegde R, Nair AG, Bajaj MS, Betharia SM, Bhattacharjee K, et al. All India Ophthalmological Society - Oculoplastics Association of India consensus statement on preferred practices in oculoplasty and lacrimal surgery during the COVID-19 pandemic. Indian J Ophthalmol 2020;68:974-80.* Crossref
16. *Ali MJ. A Surgical Protocol to Mitigate the SARS-CoV-2 Transmission Using Multifocal Povidone-Iodine Applications in Lacrimal Surgeries During Coronavirus Disease 2019 (COVID-19) Pandemic. Ophthalmic Plast Reconstr Surg 2020;36:416-7.* Crossref
17. *Ali MJ. Coronavirus Disease 2019 (COVID-19) Pandemic and Lacrimal Practice: Diagnostic and Therapeutic Nasal Endoscopy and Dacryoendoscopy. Ophthalmic Plast Reconstr Surg 2020;36:417-8.* Crossref
18. *Ali MJ. COVID-19 pandemic and lacrimal practice: Multipronged resumption strategies and getting back on our feet. Indian J Ophthalmol 2020;68:1292-9.* Crossref
19. *Quaranta-Leoni FM, Paridaens D, Verity D. European Society of Ophthalmic Plastic and Reconstructive Surgery (ESOPRS) recommendations for oculoplastic surgeons during the COVID-19 pandemic: a hallenge for the future. Orbit. 2020;39:460-2.* Crossref
20. *O'Rourke M, Hardy T, Au A, Burt B, Davies R, Friebel J, et al. Oculoplastic, Orbital, and Lacrimal Care in the Coronavirus Disease 2019 Pandemic: A Shared Experience From Melbourne. Ophthalmic Plast Reconstr Surg 2020;36:414-6.* Crossref
21. *Mak ST, Yuen HK. Oculoplastic surgery practice during the COVID-19 novel coronavirus pandemic: experience sharing from Hong Kong. Orbit 2020;39:316-8.* Crossref