

TOOLKIT GUIDE

Eye disorders in the context of prolonged COVID-19 symptoms – Diagnosis and management

Validated by the HAS Board on 10 November 2021

Eye-related symptoms, which are not considered to be central COVID-19 symptoms, nonetheless feature prominently and are the subject of frequent complaints. They require an accurate diagnosis and tailored management. The ophthalmology investigation can also provide important information on the physiopathology of these symptoms.

Eye complaints: emergency or non-emergency?

Non-emergency

Normal visual acuity

- Burning
- Tearing
- Itching
- Gritty sensation under eyelid
- Twitching of one or both eyelids
- More or less painful lump in eyelid
- Transient scintillating scotoma in migraine context
- Eye strain
- Red eyelids
- Diffuse redness of the eyes

Diagnostic screening

Examination with naked eye: the general practitioner will be able to diagnose a **chalazion*** or a **stye**** but, these eyelid conditions aside, a specialist examination by an ophthalmologist is required.

(When presented with these non-urgent symptoms, the general practitioner may refer to the appendix for diagnostic and therapeutic guidance)

Slit lamp examination: can be used to diagnose dry eye syndrome*** associated more or less with superficial punctate keratitis and/or blepharitis ****.

Emergency: refer to ophthalmologist

1. Vision anomaly:

unilateral or bilateral visual impairment, reduced field of vision, distorted vision, blurred vision, scotoma, photopsia (flashes), altered colour vision

2. Eye pain+/- photophobia, pain with eye movement

3. Neuro-ophthalmological symptoms:

pupillary reflex abnormality, strabismus, diplopia, persistent scintillating scotoma (all or part of the field of vision filled with moving and blinding bright spots), visual hallucinations, apperceptive agnosia, prosopagnosia (difficulty visualising faces), visual snow, permanent or intermittent ptosis of recent onset

4. Intense visual fatigue with pain when focusing

Diagnostic screening

When presented with any urgent symptom or sign, the general practitioner must refer their patient to an eye emergency department or make an urgent referral to an ophthalmologist

1. Vision anomaly:

- In the ocular fundus examination (OFE) supplemented by retinal imaging (OCT +/- angiography), screen for **retinal damage** such as RVO (retinal vein occlusion), RAO (retinal artery occlusion), PAMM (paracentral acute middle maculopathy), AMN (acute macular neuropathy), central serous choroiditis or **optic nerve damage** such as AION (anterior ischaemic optic neuropathy) or **papillary oedema**

2. Eye pain+/- photophobia, pain with eye movement

- Slit lamp screening test for **dry eye syndrome***** (associated more or less with superficial punctate keratitis) or **anterior uveitis**
- Pain with eye movement may indicate **optical neuropathy**, in particular anti-MOG (*anti-myelin oligodendrocyte glycoprotein*)

3. Neuro-ophthalmological symptoms:

- Screen for binocular diplopia using the screen and Lancaster tests
- Screen for papillary oedema, a possible sign of IHT, via the OFE (in case of papillary oedema: conduct an assessment with visual field and brain imaging)
- Screen for myasthenia, stroke, brain lesions

4. Intense visual fatigue with pain when focusing

- Screen for **binocular vision anomaly**, **heterophoria** more or less associated with **ocular surface disorder** (tear composition disorder or dry eye syndrome); screen for associated **general fatigue**

Management

1. Vision anomaly, isolated blurred vision, distorted vision, micropsia, macropsia

- Multidisciplinary management (ophthalmologist, cardiologist, internal medicine specialist, neurologist) with retinal imaging (OFE, OCT, +/- angiography). Treat according to underlying cause. If applicable, report as adverse event if post-vaccination

2. Eye pain +/- photophobia

- For dry eyes: see Appendix
- For blepharitis: see Appendix
- For keratitis: refer to treatment of dry eye syndrome in Appendix
- For uveitis, multidisciplinary management, by an ophthalmologist, aided by an internal medicine specialist, generally combining, after assessment, topical or systemic corticosteroid treatment +/- dilated pupils.

3. Neuro-ophthalmological symptoms

- Pain with eye movement with +/- scotoma/reduced field of vision

Multidisciplinary management with an ophthalmologist to interpret the field of vision, analyse visually evoked potential (VEP), examine the retina and the optic nerve with optical coherence tomography (OCT), which can particularly be used to analyse the retinal nerve fibre layer emerging from the optic nerve (RNFL) + neurological advice with lumbar puncture (LP) and brain imaging. The neurologist will manage the treatment

- Photopsias, afterimages, hallucinations, apperceptive agnosia, prosopagnosia, altered colours, visual snow, pupillary reflex abnormality, onset of strabismus, oculomotor palsy, diplopia, ptosis

Multidisciplinary management according to symptoms and context (ophthalmologist, cardiologist, neurologist, with full neurological assessment with brain imaging (LP, MRI, CAT and PET scans)

4. Intense visual fatigue with pain when focusing

- Multidisciplinary management: binocular assessment if an abnormality is detected in the screen test with completion of a Lancaster test. In cases of decompensation from previous status, orthoptic treatment is indicated; otherwise in case of an oculomotor paresis/palsy profile or major visual fatigue: management by a neuro-ophthalmologist and neurological assessment with brain imaging.

Take home messages

In cases of eye complaints in the context of prolonged COVID-19 symptoms:

- the Primary Care Physician must always refer their patient to an ophthalmologist to prevent diagnostic error
- retinal vascular and/or choroidal or ocular surface neuro-ophthalmological symptoms need to be looked at

Conclusion

Knowledge of prolonged COVID-19 symptoms is constantly evolving. The mechanisms responsible for multiorgan impairment include inflammation, thrombotic phenomena, autoimmunity and deregulation of the autonomic system and of blood flow regulation.

The eye is not spared, and all layers of the eye can be involved. The attending ophthalmologist has a key role in diagnosing patients and referring them to specialist centres if deemed necessary. A properly conducted ophthalmology investigation will lead to an accurate diagnosis and indicate further investigations of other organs, particularly the brain, but also the heart, and the vascular system in general.

Bibliographic references

1. Dalia Tohamy,¹ Mohamed Sharaf,¹ Khaled Abdelazeem,¹ Mohamed G A Saleh,¹ Mahmoud F Rateb,¹ Wael Soliman,¹ Salma M Kedwany,¹ Mohamed Omar Abdelmalek,² Mohammed A Medhat,² Amal M Tohamy,³ and Hany Mahmoud⁴. Ocular Manifestations of Post-Acute COVID-19 Syndrome, Upper Egypt Early Report. *J Multidiscip Healthc.* 2021; 14: 1935-1944.
2. Bracerros KK, Asahi MG, Gallemore RP. Visual snow-like symptoms and posterior uveitis following COVID-19 infection. *Case Rep Ophthalmol Med.* 2021;2021:6668552.
3. Gambini G, Savastano MC, Savastano A, et al. Ocular surface impairment after coronavirus disease 2019: a cohort study. *Cornea.* 2021;40(4):477–483.PMID: 33214412.
4. Yamaoka-Tojo M. Vascular Endothelial Glycocalyx Damage in COVID-19. *Int J Mol Sci* 2020;21. doi:10.3390/ijms21249712
5. Pablo Argüeso. The Disrupted Glycocalyx as a Source of Ocular Surface Biomarkers. *Eye Contact Lens.* Author manuscript; available in PMC 2021 Mar 1. Published in final edited form as: *Eye Contact Lens.* 2020 Mar; 46(Suppl 2): S53–S56.
6. Gerd Wallukat et al. Functional autoantibodies against G-protein coupled receptors in patients with persistent Long-COVID-19 symptoms. *J Transl Autoimmun.* 2021;4:100100.

Appendix

* Chalazion:

A chalazion is a benign cyst that develops to form a lump in the thickness of the eyelid. It is caused by inflammation, and not infection, of one or more sebaceous glands, called the meibomian glands. These glands produce sebum, an oily substance contained in tears. The eyelid may or may not be inflamed with visual impairment if the chalazion is large. Tearing can occur if the chalazion is internal. Mild conjunctivitis is often observed opposite. The patient may complain of increased light sensitivity, pain, or a gritty sensation in the eye.

The chalazion can nevertheless become infected at a later stage.

During the COVID-19 epidemic, increased incidence of chalazions has been observed, probably linked with mask-wearing.

The treatment depends on the stages of the chalazion. Over 50% of chalazions resolve with good eyelid hygiene. When the chalazion is relatively new, applying compresses soaked in warm water two to four times daily for 15 to 20 minutes, combined with applying anti-inflammatory ointments for a few days, will often result in rapid resolution. Topical antibiotics are only

needed if infection is present. In some cases, a surgical chalazion curettage treatment is considered if medical treatments have not had the desired effect after two months.

**** Stye:**

Styes are formed at eyelash roots, due to the root of an eyelash becoming infected. They contain pus. They are generally treated by removing the infected eyelash and applying a broad-spectrum antibiotic ointment for a few days.

***** Dry eye syndrome:**

- Dry eye syndrome includes many possible eye symptoms: gritty sensation in eyes, increased light sensitivity, burning, itching, stinging, eyes prone to redness, eye strain, etc.
- To obtain an accurate diagnosis of dry eye syndrome, the physician may perform various specific investigations, including:
 - The *Break-Up time* (BUT) (of the tear film) and fluorescein uptake will assess tear secretion by the tear glands;
 - Schirmer's test, which consists of placing strips of blotting paper in the cul-de-sacs
- The treatment consists of instilling artificial tears in eye-drop or spray form, preferably free from preservatives.
- In cases of superficial punctate keratitis, products in gel or ointment form, including Vitamin A ointment, may be prescribed.
- In more severe cases, special heating glasses (known as "moisture chamber glasses") may be prescribed to block tear evaporation.
- In cases of inflammation: anti-inflammatories, corticosteroid- or ciclosporin-based ointments may be indicated.

****** Blepharitis:**

Blepharitis is an inflammation along the edges of the eyelids.

This condition is often desperately chronic, with clinical signs including itching, burning or gritty sensations, and tearing. Scabby debris is often observed around the eyelashes. In some cases, blepharitis is accompanied by redness of the eyes.

The treatment is long-term. It consists of applying warm compresses on the eyes and "massaging" the meibomian glands.

Topical antibiotic or anti-inflammatory ointment-based treatment may be needed for a few days each month in cases of severe inflammation or secondary infection.