The Canadian Journal of Neurological Sciences (2023), **50**, 158–159
doi:10.1017/cjn.2021.255

Canadian Journal of Neurological Sciences
Journal Canadien des Sciences Neurologiques

Letter to the Editor: Published Article

The Virtual Neuro-Ophthalmic Exam

Kia Gilani and Felix Tyndel
Division of Neurology, University of Toronto, Toronto, Ontario, Canada

We wish to supplement the article "The Virtual Neurologic Exam: Instructional Videos and Guidance for the COVID-19 Era" [1] with additional parts of the neuro-ophthalmology examination.

While tele-neurology and tele-neuro-ophthalmology have been described elsewhere,[2,3] we share some of our experience with additional examination techniques which we have used to assess optic neuropathies, visual field defects, ocular motor cranial neuropathies, and myasthenia gravis.

While online examinations are not meant to replace in person examinations, neuro-ophthalmic signs can be detected using common household items. The following instructions can be given to the patient to prepare for the appointment:

1. Set the camera at eye level and practice leaning in, so that the bridge of your nose is at the centre of the screen for the examination.
2. Face a light source and if possible avoid backlighting.
3. Place a small object to look at about 6 feet behind the camera and at eye level.
4. Have a penlight or a camera phone flashlight, a large spoon to cover an eye and a bright red object.
5. If need be, have a helper to assist with the examination.

The patient and/or helper are instructed further during the visit.

To examine the pupils:

1. The patient or helper holds a flashlight directly under the chin to show the pupils without directly illuminating them to detect anisocoria.
2. Step 1 is repeated in dim light. Evident or greater anisocoria in dim light suggests an oculosympathetic pathway defect; greater anisocoria in bright light a parasympathetic defect.
3. The patient or helper shines the light in each eye, or the patient opens and closes their eyes, to test the pupillary light responses.
4. The patient or helper covers each eye in turn while facing ambient light. If the uncovered pupil dilates rather than constricts, that is evidence of a relative afferent pupillary defect (RAPD).

To test colour vision:

1. Each eye is covered by the patient or helper while the patient looks at a red object to detect colour desaturation.

To test the visual fields:

1. If the patient is aware of a scotoma, they should hold a blank sheet of paper in front of each eye and draw the missing or unclear area(s).
2. For field defects of which the patient is unaware, they are asked to look at the examiner's nose while covering each eye in turn and asked if they can see the examiner's nose and mouth clearly (which would identify a central scotoma). The patient is then asked to count the examiner's fingers in each quadrant. A helper can also be instructed to test visual fields by confrontation. The patient and helper sit facing each other sideways to the camera, cover the eye opposite the other's and look at each other's nose. The helper then places one or two fingers halfway between themselves and the patient in each quadrant of that eye for the patient to count. If the patient does not see fingers the helper can see in that quadrant, a visual field defect has been shown.
3. Step 2 can be repeated with a red object instead of finger counting, because red colour desaturation may be more sensitive in detecting visual field defects.

To test eye movements:

1. The helper stands in front of the patient and shines a light toward them to elicit the corneal light reflex. If the light is off the centre of the pupil, the eyes are misaligned; for example, the light reflex displaced outwardly from the centre of the pupil signifies esotropia.
2. With the patient looking at the fixation target, the patient or helper covers an eye with the spoon to perform cover-uncover and cross-cover tests to reveal a tropia or a phoria, respectively.
3. If the patient reports diplopia, they are asked to extend their arm fully in front of them with a finger behind the camera to avoid obstructing the view and report if there is diplopia in primary position. To gauge the extent of diplopia in different gaze directions, the patient is then asked to swing their arm to horizontal and vertical end-gaze respectively, parallel to the ground for horizontal diplopia and perpendicular for vertical diplopia. In downward gaze, the patient or helper gently lifts the upper eyelids, so the eyes can be seen.
4. If ductional deficits are suspected but cannot be seen due to the camera angle, ask the patient to keep their thumb directly in

Corresponding author: Felix Tyndel, Division of Neurology, University of Toronto, Toronto, Ontario, Canada. Email: f.tyndel@utoronto.ca
Cite this article: Gilani K and Tyndel F. (2023) The Virtual Neuro-Ophthalmic Exam. *The Canadian Journal of Neurological Sciences* **50**: 158–159, https://doi.org/10.1017/cjn.2021.255

© The Author(s), 2021. Published by Cambridge University Press on behalf of Canadian Neurological Sciences Federation

https://doi.org/10.1017/cjn.2021.255 Published online by Cambridge University Press

front of them in straight ahead gaze and then turn their head to find the direction of gaze in which the diplopia occurs. The change in head angle can show a ductional deficit. For example, in a left abducens palsy, the patient turns their head right until left end-gaze brings the lateral aspect of the left eye into full view.
5. If a superior oblique palsy is suspected, the patient is asked to tilt their head right or left to look for improvement or worsening of vertical diplopia.
6. To test saccades, the patient holds their arms out with each index finger pointing up and looks from one finger to the other. For vertical saccades, the patient holds their fingers horizontally, one above the other.

To test the eyelids:

1. To look for ptosis, the patient looks at the fixation target and the relative distances of the upper lids to the light reflexes (marginal reflex distances), or the distances from the edges of the upper lids to the limbus, can be estimated.
2. Von Graefe's sign in thyroid eye disease is detected by asking the patient to look down. The upper eyelid follows at a slower rate, exposing the upper limbus. Lid lag is shown if the eyelid stays elevated on downgaze.

To test for ocular manifestations of myasthenia gravis:

1. To elicit a curtain sign, the patient looks at the fixation target. The patient or helper is asked to lift the more ptotic eyelid up, which can reveal ptosis in the other lid.
2. To elicit fatiguable ptosis or diplopia, the patient is asked to look up at the ceiling for 60 seconds or sideways for 180 seconds, respectively.
3. To elicit the "peek sign", the patient closes the eyes tightly and keeps them shut. With fatigue of the orbicularis oculi, the lids separate and show a rim of sclera.
4. Cogan's lid twitch sign can be elicited by asking the patient to look down for 15 seconds and to then look up at the fixation target. An initial elevation of the eyelid is followed by recurrence of ptosis.

Disclosures. The authors do not have any conflict of interests to declare.

Statement of Authorship. Kia Gilani wrote the manuscript. Felix Tyndel supervised and edited the manuscript.

References

1. Al Hussona M, Maher M, Chan D, et al. The virtual neurologic exam: instructional videos and guidance for the COVID-19 era. Can J Neurol Sci. 2020;47:598–603.
2. Grossman SN, Han SC, Balcer LJ, et al. Rapid implementation of virtual neurology in response to the COVID-19 pandemic. Neurology. 2020;94:1077–87.
3. Lai KE, Ko MW, Rucker JC, et al. Tele-neuro-ophthalmology during the age of COVID-19. J Neuro-Ophthalmol. 2020;40:292–304.
4. Sun LD, Odel JG. Going back one car in the train: evaluation of the relative afferent pupillary defect in the era of tele-neuro-ophthalmology. J Neuro-Ophthalmol. 2020;40:442–3.

https://doi.org/10.1017/cjn.2021.255 Published online by Cambridge University Press